

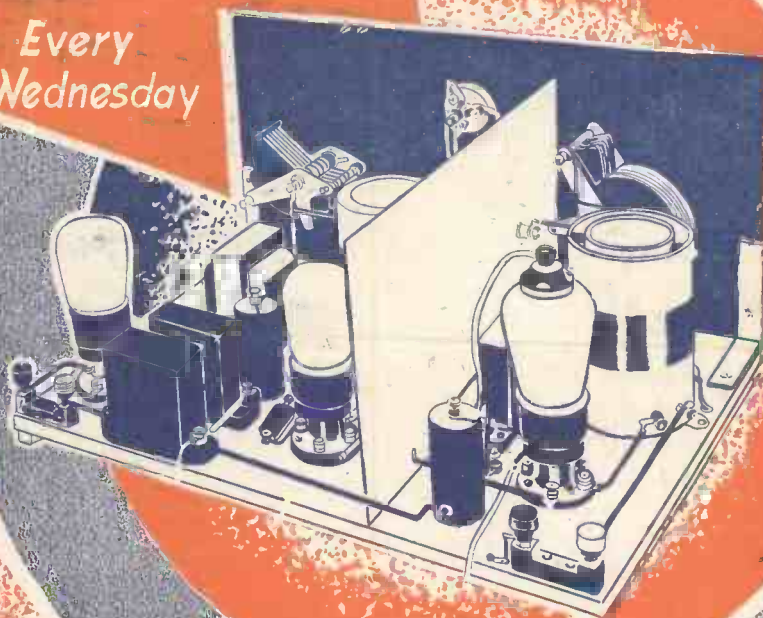
PHOTOPLAN AND BLUEPRINT WIRING GUIDE for our 39/- S.G. THREE

Amateur Wireless ^{3d} and Radiovision

Every
Wednesday

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News and Gossip of the Week

Short Sea Route

THOSE who are sick of the quality of Belfast transmissions will be glad to hear that the B.B.C. has now finally fixed up a short sea route for the submarine cable.

In the near future the Manchester-Isle of Thanet-Belfast route will be scrapped in favour of the new submarine cable route Glasgow to Belfast. Although this means a longer land line, it shortens the sea route—and up goes the quality.

Better Land Lines

IF your memory of broadcasting goes back to the beginning of things, you will appreciate the fine quality of present-day land lines.

Except for the Bristol-Plymouth link, all the lines are now of the high-quality underground type.

Empire Signals

BETTER signals are reaching various parts of the Empire now than at the same time last year. The reason is simple. Engineers have more data about the effect of seasonal weather changes on wireless radiations, and can make allowances for them.

Cecil Graves, Empire Director, still holds before him the vision of an Empire linked as surely by wireless with London as London now is by land line with the provinces.

Cost of New Masts

TO further this ideal, the engineers are busily experimenting with new types of short-wave aeriels. The 350-foot masts now being erected at Daventry will cost us over £1,000.

Still more money will have to be spent on the Empire service in the near future.

Droitwich Quality

WE have to thank Mr. Wilson, of the B.B.C.'s Clapham Research, for the promised high quality of the Droitwich transmissions. In order to make our new station the best-quality long-waver in Europe, a small amount of power has to be sacrificed.

But with 150 kilowatts this should not worry us.

Small-hours Tests

VERY late night listeners have been puzzled lately by the transmissions after midnight of

both Daventry and Midland Regional.

We can explain them. Tests are being carried out at the Fulwell depot of the L.P.T.B., in order to minimise the interference of the trolley buses with broadcast reception.

Signals from the Daventry stations form a background to these tests. An example of bureaucratic co-operation!

Meet the Colonel!

THAT man of mystery, Colonel Dawnay of the B.B.C., will come out into the open for the first time on April 7.

He will address a National meeting of group leaders at Broadcasting House. Sounds perfectly thrilling, doesn't it?

Talks Cancelled

IF you want a true commentary on the strained relations among European nations at the moment, the B.B.C. can supply it.

Within the last week or so they have had cancelled talks from France, Spain and Austria.

More Regionals

ONE important result of the opening of Droitwich will be that small stations will not have to concentrate on the National programme, and will, therefore, be able to broadcast a local or regional alternative.

Plymouth, Bournemouth, Newcastle and Belfast will be able to send out a composite regional programme, as Droitwich will cover their service areas with a good National signal.

B.B.C. at Heston

RESEARCH boys from the B.B.C. are down at the Heston Airport on some very unusual work. They are taking field-strength measuring apparatus up in aeroplanes.

Which mysterious goings on can be lined up with the Daventry experiments with the new Empire masts. They are trying to find out which system gives the best radiation.

Fateful Geneva

BY the time you read this the International Broadcasting Union will have met at Geneva to sort out the long-wave mix-up.

The B.B.C. will be represented very strongly by Vice-Admiral Sir Charles Carpendale, Noel Ashbridge, C.

F. Atkinson, and L. W. Hayes.

We shall be very fortunate if the present immunity of Daventry from heterodynes is maintained when the new long-wave plan comes in action.

End of Children's Hour?

WHEN Droitwich takes over the Daventry and medium-wave National stations job, what is going to happen to the Daventry Children's Hour?

It seems certain that it will have to be scrapped. Because at 5.15 p.m. Droitwich will be broadcasting the Henry Hall dance music now sent out by the medium wavers.

Bigger B.B.C. Band!

TALK of Henry Hall leaving the B.B.C. is ill-informed. On the contrary, he is more popular than ever with listeners, and will renew his contract with the B.B.C. in June.

He may then take the chance to make certain changes in the make up of the orchestra, probably strengthening the brass side.

Artistic Intervals

VAL GIELGUD wants more intervals in broadcast plays. Not ten-minute or quarter-hour intervals as at the theatre, for, of course, that would drive people to other stations or, possibly, to switch off.

No, he wants one- or two-minute intervals. Just time enough to give the listener pause—time to poke the fire or put the cat out.

Less Anonymity

THAT dark pall of anonymity shrouding B.B.C. announcers will be officially lifted soon, when



[Keystone photo] An ultra-violet-ray meter, which can be used to measure out the E-waves of sunlight, has been developed by the General Electric firm in America. See Percy W. Harris's article on page 233



Captain C. N. Forbes, of the lighthouse steamer "Hesperus," which rescued the keepers of the Dublin Heartache Lighthouse at Christmas, has been presented with an Ekco 74 all-mains receiver

the B.B.C. will publish all their photographs and names.

Our sprightly contemporary, Radio Pictorial has already shown a wondering world the portraits of Messrs. Hibberd and Grisewood, of course.

At this rate it will not be long before we copy the Americans, and let our announcers announce themselves in the programmes.

Lucerne Ranger

DON'T miss reading "The Experimenters" this week. On pages 239 to 242 they "spill the beans" about their amazing 39/3 three-valver. A real fan's set!

Only 4/6 of Your Licence Fee Goes to the B.B.C.!

HOW many of you ever think what happens to that ten shillings you pay annually for your wireless licence? If you think at all about it you probably assume that most of it goes into the production of the programmes, and the rest to pay for the various stations that send out these programmes.

But that is all wrong, you know. Not half of the ten shillings ever gets to the B.B.C. More than half goes into the hungry coffers of the Treasury.

When broadcasting began the idea was that this ten shillings would put the service on a public-utility basis, without resort to the commercial huckstering associated with the sponsored programme idea as practised in America and other countries.

Treasury and Post Office Percentages

It was quickly found that the Post Office was taking a percentage for collection expenses, and that the Treasury was to take an increasing percentage as the licence revenue grew.

To-day, with over six million licences, there is a net revenue of at least three million pounds, of which, as we say, over half is taken by the Post Office and the Treasury.

We have before us the latest report of the B.B.C., showing its figures for the year 1933. In this, the seventh report of the Corporation, we see that there is now a chronic shortage of revenue, insufficient to meet the growing demands of the programme and technical sides of broadcasting.

During the past year, the B.B.C. had available the sum of £1,490,099, but it spent no less than £1,890,158. The deficit of £400,059 has been made up by using up all the depreciation fund and by borrowing.

From this we see that for future development of the broadcasting service there is nothing in hand, and so the B.B.C. will have to meet all immediate needs out of current revenue. And the sum borrowed must, by the terms of the licence, be paid back by December 31, 1936.

As the B.B.C. rightly states, there is an unending need for capital expenditure, especially in the erection of new stations. For example, there is the cost of the new Droitwich station to be faced this summer, the construction of the Northern Ireland station, and the removal of the London, West and North Nationals to new regional sites.

Quite apart from these domestic developments, more money will shortly be needed to expand and improve the Empire broadcasting service, which at the moment is financed entirely by the B.B.C. from licence revenue in this country.

Looking into the revenue accounts, it is clear that quite a tidy sum might have come to the B.B.C. but for Treasury inroads. For 1933 the revenue from licences under the terms of the P.M.G.'s Licence was £1,685,352, but the Corporation made an emergency contribution to the Exchequer of £225,000, so that the increase for the year in revenue was only £153,899.

In spite of this, the B.B.C. was able to devote £786,354 to the broadcast programmes, an increase of £122,921 over the figure for 1932. This was partly made possible by a continued increase in the profits from B.B.C. publications.

Progress with the regional scheme and other engineering improvements increased costs on that side of the Corporation's activities, so that £293,070 was spent in 1933 compared with £252,260 in 1932.

During the year 1933, the gross amount paid by you and all other listeners in this country for wireless licences, based on a total licensed population of a little under six million, was £2,968,000.

Unfortunately for the Corporation, its share of this total was not based on this figure but on the figures of the previous year.

Money the B.B.C. Does Not Receive

Thus the B.B.C. did not gain any benefit from the great increase in the number of licences. In addition it suffered, in accordance with the terms of its licence, from a diminishing percentage of the increase during that preceding year.

As if this was not enough, the B.B.C. had to pay out an emergency sum during the crisis, as well as £121,000 for income tax. In view of all these deductions it is a wonder the B.B.C. has been able to carry on as well as it has.

There is no disguising the fact that the B.B.C. now gets only 45 per cent. of the gross licence revenue, which works out at about 4s. 6d. per licence. This is not enough for first-class service.

(Left) From these giant 700-ft. masts the aerial of the new Droitwich station will radiate your National programme. Work on the new station is forging ahead, the masts and the building being already erected to take the new transmitters

[Planet News Photo]

More Efficient Indoor Aerials

HIGH-POWER stations and super-sensitive sets have combined to make the large and imposing outdoor aerial of the early days rather a waste of time and money.

To-day there are very few sets that will not bring in plenty of stations at good strength with the most meagre piece of wire slung up somewhere indoors.

On my set I have never used an external aerial wire. I have all sorts of sets, for broadcast and short-wave reception, and I find that with a well thought out indoor wire I can get the ends of the earth—if need be.

Where so many amateurs fall down is in trying to make the indoor wire so neat and tidy that they forget all about the elementary principles of handling high-frequency currents.

Capacity Effects

Of these the most important is to keep the wires carrying the high-frequency current well away from earthed bodies. If you ignore this point you will produce capacity effects which, although they may not have any apparent effect on your reception of nearby stations, will cut down the sensitivity on the distant ones.

Many and various are the ways of erecting an indoor aerial, but perhaps one of the simplest is a single wire round the picture rail—but not behind it. Space the wire by at least 1 inch from the woodwork. You can buy little stand-off insulators known as Racs. These have two prongs to press into the woodwork to hold them secure, and on the body of the insulators there is a saw-toothed edge that will firmly hold the wire in position.

If you space eight or nine of these round three sides of the room, you have ample support for an indoor aerial of from 25 to 30 ft.

When erecting this wire see that it is well clear of such things as telephone and electric-light conduits; or you will suffer all kinds of unnecessary noises and possibly there will be mains hum.

Experience shows that a thin multi-stranded copper wire, insulated by the usual cotton or other material, is most suitable. It must be flexible. I don't favour a solid type of wire.

Once when I was stuck, I used Lewcos frame aerial wire which did the trick very well—in fact I left it up and have since received America on it.

Advantage of Loft Aerial

When your wireless reception room is low down in the house a loft aerial is usually an advantage over a simple wire inside the room. Most houses have a moderately large loft in which a zig-zag wire can be fitted up with the racs. Don't put up more than about 25 ft., because you have to bring in the down lead—and that is often the snag.

Most amateurs seem to bring the lead down the landings in a most inefficient way, round walls, under carpets and ultimately it reaches the set—having lost a considerable amount of energy en route, as well as adding greatly to the aerial's capacity.

There is another way out. Most roofs have a small window or skylight, and through this I suggest you lead the loft aerial, so that you get a straight down lead clear of the house wall. Incidentally, you will gain quite a lot of signal pick-up from this vertical portion—in fact if it is a high house you may find that the vertical wire alone makes a very good and efficient little aerial.

Where the wire has to go over the guttering you ought to use insulated wire—in fact for the down lead as a whole it is advisable to use proper outdoor aerial wire, preferably of the covered variety.

MALCOLM HARVEY.

Listening Under the Lucerne Plan

Your Guide to Europe's Best Stations

These notes, prepared by the "Amateur Wireless" Technical Staff, will interest all listeners—and in particular constructors of "The Experimenters" Lucerne S.G. Ranger described on pages 239-242 of this issue.

HOW are you getting along with this Lucerne Plan? If you are a keen ether-raker you will have re-adjusted your ideas as to which stations are worth hearing. If, on the other hand, you are just a casual eavesdropper to the foreigners' programmes you may be rather muddled still as to which station is which.

During our almost nightly vigils of the ether, testing out various sets for the constructor and buyer, we have come to know—and appreciate—this Lucerne Plan rather well.



Frau Nikolas von Horthy, wife of the Hungarian Regent, faces the Budapest microphone

It is all very different from, say, a year ago, or even from, say, Christmas, 1933. Before the great plan came into action in January of this year we used to rely on certain foreigners to give us our alternative-programme entertainment, while certain other stations were never even considered from an entertainment point of view.

Now we are hearing little stations coming through with such power that they give real entertainment on a good set. For example, there is Copenhagen on its new wavelength of 255.1 metres and increased power of 10 kilowatts. This is a shining example of a station that has taken on an entirely new character. It is now coming through better than the long-wave Kalundborg station—which means it is extraordinarily good.

Then take Athlone. Although this Irish Free State giant has always been very strong at night, the fading before the Lucerne Plan came into action usually prevented it from giving us real programme entertainment. True, a set with self-adjusting volume control makes up for a lot of fading, but Athlone used to go right out—and no set can cope with that condition.

Under the new plan, Athlone on 531 metres comes through as far as we are concerned almost like a local, with fading almost negligible except, for some reason, late at

night. A set with good S.A.V.C. will keep this station at level strength for hours on end.

It might be a good idea for us to review the medium-wave band first, and tell you how we find things. You can then compare our impressions with your own experiences. Of course, conditions vary a lot in different parts of the country, but we feel that there are at least thirty stations now capable of giving good programmes at most of the densely populated centres of the British Isles.

Right at the very top of the medium-wave band we find Budapest, a wonderful station with its enormous power of 120 kilowatts. Perhaps this is the easiest of the long-distance stations to log. Just turn up to the very uppermost limit of your dial and there you should find this delightful Hungarian station.

So powerful is this station that it can often be heard at good strength in the afternoon, long before it gets dark. At lunch time, for instance, you can invariably pick up a programme of gypsy music by one or other of the well-known tzigane orchestras.

We are going to stress stations that can be picked up in the daytime, partly because almost anyone can get stations at night and there is not much point in telling you what you probably already know, and furthermore there are many people who get odd periods off in

the daytime and who do not realise how many foreigners can be picked up.

Just below Budapest is Beromunster, which, as a rule, gives some very good dance music on Sunday afternoons. With a good set you should be able to hear this station clear of Budapest above and Athlone below. There should be no side-band splash or heterodynes.

Mühlacker, on its new wavelength of 522.6 metres, is very disappointing considering its high power of 100 kilowatts. The reason is due to a temporary aerial, but this will be remedied within a very short time and we may



Mrs. van Rees gives home dress-making talks from Hilversum

expect to hear this German at something like its former stentorian volume.

Another station that disappoints us under the new plan is Vienna, on 506.8 metres. This is a 120-kilowatt station but it does not sound like it.

Now we come to a rather queer state of affairs. On 499.2 metres is Rabat, which shares this channel with Sundsvall. When Rabat is on the air it completely washes out Sundsvall, although its power is lower. There is no interference.

Tophole Signals from Florence

Florence is the next station of interest. On 491.8 metres, with quite a medium power of 20 kilowatts, it is a tophole signal. It invariably relays Turin which is a good thing for Londoners, who can now get their old favourite programmes of Turin via Florence, which is clear of interference.

On the other hand North-country listeners may find that Florence fades somewhat, in which case they can get Trieste doing the same programme.

Of course Brussels No. 1 is still as good as ever on its new wavelength of 483.9 metres. Every evening you can get dance music, and on Sundays its programmes are usually quite bright.

Prague, with 120 kilowatts, on 470.2 metres, is now well away from North Regional's wavelength, and is very well heard—without any interference. Syncopated piano duets seem to be one of the popular features of this station's early-evening programmes.

Now Lyons on 463 metres is not a station you would rely on in the old days, but we find it is coming over extraordinarily well. This is a good thing, because the Ecole Supérieure station on 431.7 metres is jammed out of existence by whistles and other etheric disturbances.

Then we come to three good stations in a bunch. Langenberg on 459.9 metres, which can be well heard from 6 a.m. onwards, North Regional on 449.1 metres—now better received outside its service area than before—and the Swiss station Sottens on 443.1 metres. This is most definitely an improved signal, now that it is clear of Midland Regional's home signals.

If you have missed the charming announcements of Mrs. Borrett you may find solace in the twinkling little voice of the lady announcer at Belgrade which on a wavelength of 437 metres is now coming in very well considering its distance and moderate power.



In the Frankfurt studio, play manuscripts are projected on to a screen. Note the producer's scribbled comments



Beatt photo

Athlone programmes are relayed through Cork, seen here. The station is built in an old prison

Certainly you ought to make an ether date with Madame Zelena Bilbiza-Lapcevic, the lady of Belgrade.

Curiously enough, Stockholm is now a "flop" compared with the old days. Its 55 kilowatts do not show to very good advantage. If you want the folk and dance music of this station get it via Motala on 1,389 metres on the long waves.

Rome needs no introduction, with its lady announcer. On Thursdays at 6 p.m. you can pick up a most interesting news bulletin in English, in which you are regaled with the achievements of the Fascist state—and how!

Next on our list is Munich, which although at first was disappointing has now come right up to expectations, and is pushing out 100 kilowatts. If you want to find it easily just tune up two or three degrees above the Midland Regional setting.

Katowitz, which used to come in with a roar, seems to have faded out rather, and the next decent foreigner is Barcelona. This Spanish

station broadcasts I.B.C. programmes late at night, coming in very well and free from fading.

Lwow—the unpronounceable Pole, is disappointing, and it is rather hard to get a relay on any other wavelength. Warsaw on the long waves cannot make up its mind where to go but at the moment you will find it on 1,200 metres, clear of trouble.

Still coming down the wavelength band, we next come upon Milan. This is very close to Scottish and London Regional, so it is wiped out for many listeners who do not use superhets. Here again, Florence comes to the rescue, or Turin if Florence is jammed.

Bucharest is well received in some areas, but the biggest failure to date is Berlin on 365.7 metres. It was not much good before, and is little better now for all its power. Perhaps, in time, a new aerial will improve its range.

If you can get Strasbourg clear of London Regional it is worth cultivating, giving good

disappointment, so far as we are concerned. The signal strength is down on previous experience, and there is usually a lot of mush around it.

Heilsberg Worth While

Heilsberg has for some years been a good signal and is still worth while if you have self-adjusting volume control.

Quite a number of stations come in well below this. Rennes with 2.5 kilowatts and Bordeaux with 12 kilowatts are good. Horby is a substitute for Stockholm if you can get it clear of London and West Nationals.

Two strangers are Monte Ceneri, on 257.1 metres, and Copenhagen, already mentioned, on 257.1 metres. Both are good.

Below this you must take pot luck, because all stations on such low wavelengths tend to be unreliable. Of those in the band from Ceneri to down to 200 metres we pick out Frankfurt; Gleiwitz, Nuremberg and Budapest No. 2 as being fair to middling.

Fécamp and Juan Les Pins are not nearly so good as they have been in the past. Fécamp's power is definitely down, and on its wavelength of 206 metres is too near the end of the scale to be really happy.

Just a word on the long waves. Still a hopeless jangle. Only 7 kilocycles separation between Radio Paris and Kootwijk, so on the average set both tend to be spoilt by side-band splash. The only station that seems to be really clear is Luxembourg on 1,304 metres, and a pirate at that!

Skimming the Surface

Well, we have only attempted to skim the surface of this long-distance listening. You will find plenty of stations at good strength; but don't judge them by their published powers—that is apt to be rather misleading in terms of reception possibilities. Position in the waveband with respect to adjacent foreigners counts more than power and distance—as far as we can see from our logging experiences.

As in the days before the Lucerne Plan, the finest way to start an exploration of the medium waveband is to deal on successive nights with just a small portion of the tuning scale.

When you have found your way about one portion and have identified the stations in that portion, you can deal in a similar way with the rest of the scale, taking your time so as to log everything accurately.

Do not make the mistake of twirling the tuning knob from one end of the scale to the other, in the vain hope of establishing every station's identity on which you happen to settle.



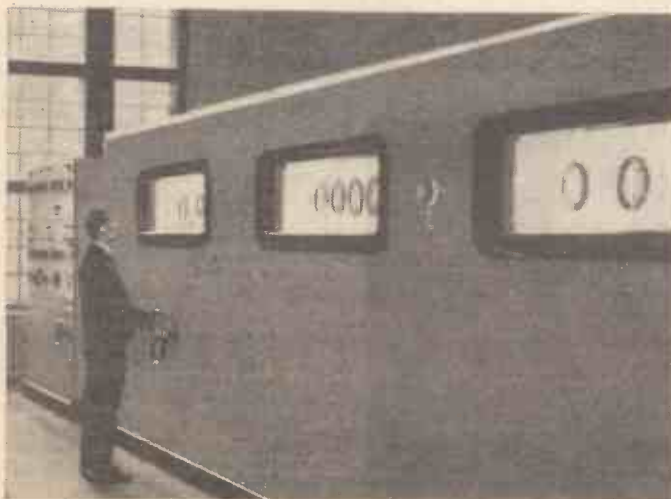
Gilliland photo

Lydia de Beöthy announces from Budapest in English, German, and French, as well as in her native tongue

music with ample volume. In the early morning, around 7.45 a.m., there is usually a snappy programme clear of the silent London. They use only 12 kilowatts, but it sounds like 100.

Not very much below London Regional, Hamburg is quite fair, as is Brussels No. 2, but the really big noise down there is Post Parisien with its new 100-kilowatt station. Breslau next to it tends to be shouted down.

At 7.10 a.m. you can always get a gramophone concert from Post Parisien, preceded by a fanfare of trumpets to wake you up properly. Now we come to Hilversum. Another



Gulliland photo

Inside Budapest's new 120-kilowatt station. The transmitter is of British design but was assembled in Hungary



Adcock photo

Fitting into position part of the aerial mast used for the Swiss station at Sottens; it is well received in this country

Are We Playing with Fire?

In this provocative article, PERCY W. HARRIS, M.I.NST. RAD.E., reveals a point of view that is as startling as it is logical. What do you think of it?

IF there is one thing about which scientists are all agreed to-day it is that light waves, wireless waves, radiant heat waves, X-rays and many other phenomena are all vibrations in the ether differing from one another only in wavelength.

The range of wavelengths included in this etheric spectrum is enormous. We have wavelengths of several miles at the upper end of the wireless range, and used for long-distance Transatlantic communication and the like, while at the other end we have such waves as the ultra-violet, which are but a minute fraction of an inch apart.

Gaps in Wavelength Spectrum

At one time there existed a very considerable gap between the range of wavelengths used for wireless and those, such as radiant heat and light, at the red end of the spectrum, but with the increasing use of short waves and the tremendously rapid progress in this direction the gap is narrowing rapidly.

You will have seen from AMATEUR WIRELESS recently that wireless waves of wavelengths expressed in centimetres are now being talked about and actually used, while limitations of apparatus which were thought to hinder further progress in this direction two or three years ago have disappeared like frost in the sun with the arrival of new methods.

Now there is an old way of expressing a difference by saying that this and that are as different from one another as chalk from cheese. Modern science will tell you that both chalk and cheese are in the final analysis the same thing—electrons and protons and so forth whirling round in some particular way, but nevertheless I doubt whether there is a single reader of this paper who cannot tell the difference between chalk and cheese, because the properties of these substances are quite different.

And in the same way when we examine the various wavelengths of which I have spoken above, we find that they, too, have different properties.

Heinrich Hertz, away back in the 'eighties, trying to put into practical form the earlier theories of Clerk-Maxwell, had in mind that these free electric waves, if he could produce them, should have properties similar to those of light. When they were produced as free waves in space he was able to reflect them, refract them, send them through prisms and make them follow many optical laws.

Waves That Differ from Visible Light

He soon found out, however, that there were many ways in which they differed from visible light. For example, they would pass freely through substances which were quite opaque to any visible light, even the most powerful. We know now, of course, that wireless waves travel through brick walls just as if they were transparent.

When Marconi started applying Hertz's work to practical telegraphy, his first wavelengths were quite short, but as with the apparatus he used he was unable to put much power into short-wave apparatus, he increased its dimensions. This, while enabling him to radiate more power, automatically increased the wavelengths used.

This interlocked increase of wavelength and increase of power went on for some time and soon we came somewhere near the range of wavelengths at present used for ship and shore communication.

By this time certain differences were beginning to be noticed. Day and night effects had been found—fading and so forth. For commercial communication the longer the wavelength the better it seemed to travel over long distances, so that when Transatlantic communication by wireless became a regular service very long wavelengths were used, partly because it was found that they were less susceptible to day and night changes of strength and partly because high power was used.

In fact, at this time the short waves were looked upon as of little value and were therefore handed over to the amateurs who, plunging in where experts feared to tread, succeeded in proving that these waves were remarkably good for low-power long-distance work. Scientific theories had thereupon to be worked up with some speed so as to fit the newly-found facts.

And so again we came to an era of the shorter waves. These were found to have all kinds of funny properties, as some wavelengths seem to be inaudible near the transmitting stations but came up at good strength



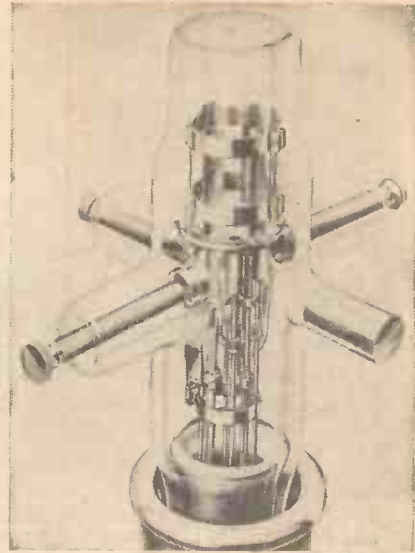
Gradewitz photo

Flooding the thorax with ultra-short wave energy. There is a great future for short-wave therapy

considerable distances away—a thousand or two miles, for example.

Special valve circuits have enabled us to get a fair amount of power into the short-wave apparatus, and recently it has been found that the very short waves which are proving very convenient for television experiments do not seem to be bent round to the earth to the same extent as longer waves and seem, in fact, to follow more closely the general properties of visual light waves.

Now remember that as we come down to the very short waves we are coming near heat, light, X-rays and all kinds of effects. It is quite conceivable that startling changes may



Gradewitz photo

Upper portion of Siemens' water-cooled valve as used for ultra-short wave therapy

result as we proceed further and further down, and who knows what we may discover or what may happen?

Let me give you a stimulating thought. A year or two ago two young laboratory workers were deputed to carry out certain very short-wave experiments in a hut at Schenectady (the great experimental station of the General Electric Company of America).

It was a bitter winter day with the thermometer well below freezing, but after these young men had been working in the hut for some time it became very hot and they took off their coats. Later they doffed their waistcoats and finally after an hour or two they were so hot and were perspiring to such a degree that they even stripped to the waist.

Still later their chief came up from the main building, opened the door and was startled to see the condition in which they were. "What on earth are you doing like that?" he asked.

"It is so hot in here," they answered.

"Nonsense! It's freezing, look at the thermometer!" replied the chief, and sure enough the thermometer showed the temperature inside the hut to be very little higher than that outside!

Bodies Heated by Induction

What had happened, as was subsequently found, was that the very short waves with which they were working had actually heated up their bodies by induction, raising the temperature to a fever heat and causing the intense perspiration. This phenomenon was later utilised, and is now regularly so used, to produce an artificial fever in certain medical treatments.

The fever temperature can be controlled to a nicety and many useful applications have been found. For example, in one particular disease it was discovered that patients who subsequently contracted malaria (which brings with it a highly feverish state) suffered much less from the original disease after the malarial attack had been cured.

This suggested that the high fever of the body might have some effect in killing the harmful germs and so in patients suffering from the disease an artificial fever induced by means of this radiation was created and, surely enough, considerable improvements and actual cures were effected.

We all know the peculiar properties of X-rays, but in the early days when these waves were first being used it was not realised how they could have a very harmful effect on

Continued on page 238



The hints given in this article apply to both home-made and commercial sets. Here is a Pyc receiver in happy surroundings

Extending Your Loud-speaker

Two Hints by the AMATEUR WIRELESS Technical Staff

SINCE the advent of the console type of set, with self-contained loud-speaker, it has been something of a problem to know exactly how to connect an external loud-speaker, either for use with the internal one, or on its own.

Almost every set on the market to-day has terminals for the connection of an external loud-speaker. This is all very well if you are going to use an external loud-speaker whose impedance characteristics are just the same as those of the internal loud-speaker. This is not very likely, and the problem remains unsolved, in spite of those two natty terminals at the back of the set.

Losing Quality and Volume

Quite apart from this problem of the commercial set, very few listeners seem to be able to work two loud-speakers from the same set without losing quality or volume, or sometimes both.

There are so many occasions on which an extension of the loud-speaker system is wanted that we really think a few practical ideas will be welcome.

Let us consider first the type of set our readers are most likely to be using—a set with an output circuit connected internally to a loud-speaker having an integral transformer. If you look at Fig. 1 the points marked A and B stand for the loud-speaker terminals. Normally wires go from these two terminals to appropriate terminals on the primary of the loud-speaker's transformer. This is fine for just one loud-speaker, but exactly what are you to do when you want to connect up another loud-speaker? It is really very simple.

We will assume that you are still going to use the present loud-speaker but that you want to hook on externally another loud-speaker of different characteristics. Well, leave all the present connections just as they are.

Its Own Transformer

We are assuming that the external loud-speaker also has its own transformer. What you have to do then is to connect up your present output to this transformer, without disturbing the present matching of the internal loud-speaker.

A 2-microfarad fixed condenser is the link between. Take a wire from the A end of the existing transformer to one side of the 2-microfarad condenser. This A connection is found in practice by trial and error, not really difficult because on one terminal you will hear nothing and on the other the extra loud-speaker will work.

To the other side of this condenser join a wire, which can be as long as you like—to the next room, down the garden, anywhere—and connect it to one side of your external loud-speaker. The other side of the loud-speaker is connected to earth. By this we mean to a near-by water pipe, radiator, or actually to an earth plate.

You will then find that the two loud-speakers will work very well together, but one may give more volume than the other. You may be able to overcome this by altering the tapping on the primary of the transformer of the external loud-speaker, but a more satisfactory method is to use a volume control for the external loud-speaker. The easiest way of arranging this control is to connect a resistance of 10,000 ohms across the primary of the loud-speaker transformer. This is, of course, a variable resistance and will not appreciably affect the internal loud-speaker.

Now it is quite possible that you may want to use two external loud-speakers as well as the internal one. This is just as simple to arrange. Instead of earthing the primary of the first transformer, connect this to the primary of the transformer of the second external loud-speaker. You then earth the remaining connection on the second transformer. The volume control is fitted as before—a variable resistance across the primary winding.

You may have a simple set without an internal loud-speaker—just a set with a plain output circuit and no choke or transformer. This you may want to use with one or more distant external loud-speakers of mixed impedances.

The Fig. 2 circuit shows you how this can be done. A and B are the loud-speaker terminals. Between these two terminals connect a 30-henry choke, passing sufficient current for the power valve. Then from the

point A, which comes from the anode of the output valve, take a lead to one side of a 2-microfarad fixed condenser. The other side of the condenser should be connected to one side of the first loud-speaker.

This may be either the primary of the transformer of a moving-coil loud-speaker, or to the winding of an ordinary balanced-armature loud-speaker.

Using Two or More

If you want only one external loud-speaker, you earth the remaining side of it. If you want to use two or more loud-speakers, you connect the blank side of the first one to the one terminal of the following loud-speaker, as shown by the Fig. 2 diagram. As you will see, the remaining side of the last loud-speaker is always earthed to some convenient point.

For evening up the volume of the external loud-speakers you can make use of the volume

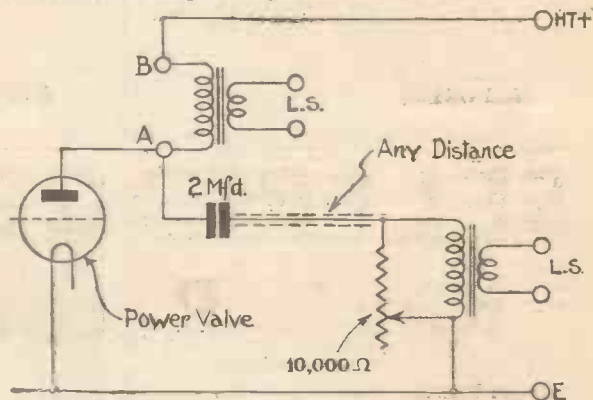


Fig. 1.—Adding additional loud-speaker to a commercial set with built-in reproducer

controls already suggested, that is, 10,000-ohm resistances across the loud-speaker windings or transformer primaries.

Whenever the extended loud-speakers are at a considerable distance you should take care to use fairly thick gauge wire. We suggest that single flex, such as used for electric-light connections.

You might note that the Fig. 2 system can just as easily be adapted for using a pair of headphones with a loud-speaker. The variable resistance across the headphones will have to be adjusted so that volume is reduced to a comfortable strength.

With these few hints in mind many of you will be able to make your own arrangements for extending the loud-speaker, or for connecting up a loud-speaker in addition to the one already in the set.

It is sometimes not fully realised how much more useful a set can be made by such an extension. Concerts and items that would normally be missed because you have retired to your room can often be heard on an extension—always providing you can get someone to switch off the set afterwards.

For the use of servants an extension is a very great boon, of course.

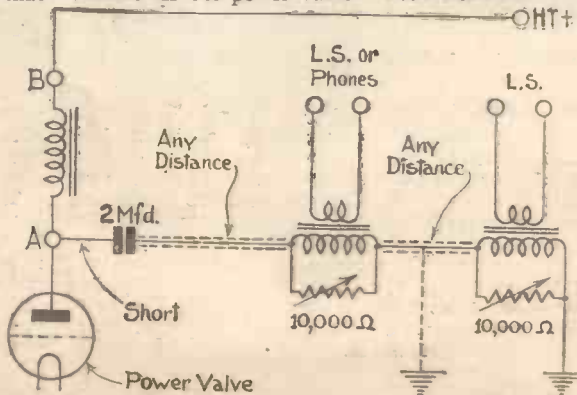


Fig. 2.—Adding a loud-speaker (or loud-speakers) to any set—particularly those without built-in reproducers



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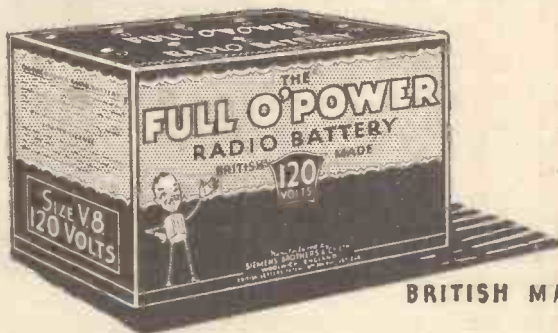
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RADIO PICTORIAL

You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

On Your Wavelength

By Thermion

Poor B.B.C.

YES, I mean it! I do think it's a rotten shame that the Government should grab no less than 5s. 6d. out of the ten shillings that you and I put down for our wireless licences. The licence fee was never meant to be a tax, but it becomes precious like one when 5s. 6d. of it goes into the Government's hungry coffers.

The fee is really a subscription to one of the world's biggest entertainment organisations, and the greater part of it should go to the people who do the broadcasting.

It's not good enough for the Government to grab the apple and to throw the B.B.C. the core. Listeners should certainly protest to their M.P.'s. If this kind of thing is allowed to go on there is no saying where it may end.

Where Your Licence Money Goes

YES, I know that the B.B.C. spent £700,000 and a bit more on programmes last year and that sum looks as if it ought to be enough.

The programmes are not the *only* things the B.B.C. has to provide; it has to put up and to maintain the stations from which they are sent out.

Not having any capital behind it, there is only one way in which the B.B.C. can pay for its stations, and that is out of its receipts from licence fees. It can borrow a small amount of money, but even if you do borrow you have got to pay it back some time.

The B.B.C. has a big station-building programme, including the North-eastern and the North Scottish transmitters, which cannot go forward at present because there is no money available. There would be plenty—these stations might be at work now—if a fair proportion of the licence fees found its way into the till at Broadcasting House.

Mysterious Fading

RECENTLY I have come across quite a number of cases in which what appeared to be a mysterious kind of fading was reported by the user of an oldish set.

The symptoms are similar in nearly all instances. When the set is first switched on reception is often perfectly normal. Then, after an hour or two, the programme fades right out and can be brought back again only by switching off, waiting a while, and switching on again.

Sometimes, but not always, loud crackling noises occur when the fading takes place. Usually it is accompanied by distortion of a particularly loathsome type.

Now, just what would you look for if you were told that a set was behaving in this way and you knew by experience that genuine fading was not occurring?

Transformers to Blame

ALMOST always it is an old low-frequency transformer that is to blame. In fact, several times of late I haven't even bothered to examine a set about which such a tale has been told.

I've just said: "I will lend you this transformer; put it in; in place of the existing one, and see what happens."

In every case but one a cure was worked in this way. The only exception was when a chappie came to see me on the day after he had gone off with the transformer and said, with a grin on his face, that he thought my diagnosis must be wrong.

On asking why, I learnt that there wasn't a transformer in his set. All that he needed was a new grid-leak for a resistance-coupled low-frequency valve!

When Transformers Warm Up

WHAT generally happens to the transformer that is responsible for these queer symptoms is that the insulation between the windings or between the windings and the core becomes shaky, owing to the deterioration of the material covering the wire. But why should the set work perfectly well for an hour or more after it is first switched on?

I believe the reason is that the transformer is then cold. When it is brought into action the passage of current through its primary windings slowly warms it up. The rise in temperature is not very great, but it is there, for all that.

When cold the "dicky" insulation may just manage to prevent current from straying into paths where it is not wanted, but as it warms up more and more leakages occur, until finally a close imitation of fading occurs.

Breakdowns and Crackles

SOMETIMES, of course, there is an actual break in the windings and, curiously enough, it is not infrequently the secondary that is affected in this way. Just why the secondary windings of an intervalve transformer should break down has always been rather a mystery to me, since no current flows through them. I am not, of course, speaking about driver transformers or output transformers, which are in a different category.

When there is a breakage the two ends of the wire may come together when the transformer

is cold, but move further and further apart under the effects of expansion. Until the gap reaches a certain width, impulses may be able to leap it, but a point is reached where they can no longer do so successfully. Crackles then make themselves heard and presently signals fade out.

Brighten Up Those Programmes!

EITHER the B.B.C. programmes are of an altogether surprising mediocrity just now or your Thermion is suffering from a touch of liver. I don't think it is the latter, for I find many who agree with me; and they can't all have livers.

These things seem to go in cycles. A year or two ago we had a similar deep depression hanging, not over its favourite Iceland, but over Broadcasting House.

It was followed by a period of much brighter and much better programmes; but now we seem to have reached the trough once more. I don't suppose it will last for long, and anyhow, there are plenty of bright spots.

If, and when, you do strike something more than ordinarily dull, you can always turn to Budapest or Vienna or Stuttgart or Rome.

Talks Increasing

HAS it struck you that we are getting now a much bigger ration of talks than used to come our way? In the early days of broadcasting, topical talking drove many of us to the verge of exasperation.

Overwhelmed by an avalanche of protests, the B.B.C. promised to reform and did better for some little time. But now I feel that the talker is creeping back again to the microphone and that the time is very nearly ripe for another mass protest.

I wouldn't mind a bit if the talkers were first-rate people discussing really interesting subjects. Far too often they are dull people talking about dull things.

I suppose, though, that we must be thankful that we don't get as much talking as some foreign countries do from their broadcasting stations. I will name no names, but there are stations abroad which never seem to do anything else, to judge by what is happening whenever I tune them in.

Unusual Valves

AT least two of our big valve companies are on the verge of putting on the market a series of A.C.-D.C. valves for use in universal sets. These valves are not designed for heating by the full mains voltage. Most of them have 13-volt, with .2- or .38-ampere heaters, and they are intended for use in series off D.C. mains and in parallel off A.C.

It would be quite possible to design a set with these valves for both A.C. and D.C. mains working at will, but a switch to throw the heaters into series or parallel would be needed, and it would also be necessary to employ a transformer for A.C. mains working.



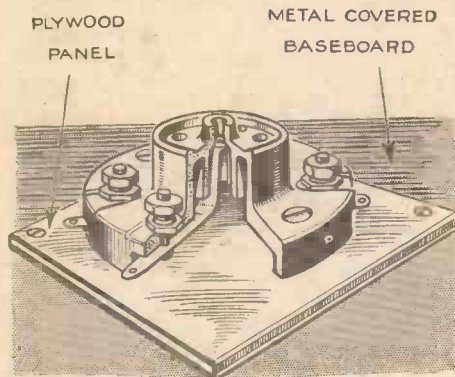
[Wide World photo]
Another cathode-ray television system! L. H. Bedford and O. S. Puckle adjusting the new Cossor apparatus, which is claimed to bring the idea of home talking pictures nearer to commercialisation

This is, I think, very sound, for I must say—remember it's merely *my* opinion that I am expressing—that I have never quite liked the idea of running a set from A.C. mains without an intervening transformer.

Safeguard Against Shorts

NOT a few of the anti-microphonic valve holders that we use have hidden away beneath them connecting pieces between sockets and terminals made of rather thin springy metal. Mount one of these holders directly on to a metal-covered baseboard or metal chassis and there is always the chance that when you press a valve into it you may cause a short-circuit by forcing these contacts against the highly conducting surface below.

My safety tip is illustrated in the accompanying drawing. Cut out some little pieces of



Follow Thermion's simple hint for mounting your anti-microphonic valve holders—and avoid those disastrous "shorts"

plywood each about 2 inches square and place one of these safety pads between each valve holder and the metal surface beneath. No extra screws are needed. Those which fix the valve holder in place simply pass through holes in the plywood.

By the way, I have seen somewhere or other a hint for using pieces of rubber cut from old inner tubes instead of the plywood. Don't use rubber if your baseboard is copper-covered. The sulphur in the rubber acts very rapidly on the metal and makes a horrid mess.

Bravo "Experimenters"!

THE Lucerne coils produced by "The Experimenters" have been a huge success, and they jolly well deserve to be. There must be thousands upon thousands of oldish sets in use now which are still perfectly good except that with their original coils they just haven't quite the selectivity demanded by modern conditions.

It isn't only the fact that stations are close together in the wavebands that makes selectivity so necessary nowadays. A 9-kilocycle separation was the basis of the old Prague Plan as well as of the new Lucerne Plan. The chief trouble nowadays is the enormous increases in output power that have taken place. Unless a set is pretty selective it suffers badly from wipe-out effects.

I know of a good many old sets that have been entirely rejuvenated by the fitting of these fine coils, not the least of whose good points is that it is a simple business to make them at home.

Homework for Wireless Fans

THE Lucerne coils have, in fact, done not a little to revive the art of making wireless things at home. Not so very long ago most people made their own coils, and very interesting work it was.

The most popular type was the basket, which old hands will remember. You had a former with an odd number of "spokes" and you wove the wire in and out of these.

One thing about making your own coils is that you can fit them exactly to your own requirements. The stray capacities differ from set to set, so that ready-made coils sometimes won't tune down low enough or go up high enough.

The home winder merely strips off a few turns or adds as many as may be required, and everything in his garden is lovely.

When Manufacturers Go Mad

FINE fellows though they are, our radio manufacturers seem to indulge in one mass act of lunacy pretty well every year. Last season they all contracted A.C. mania (or mainsia, if you prefer it) and neglected the battery set hopelessly.

This season they have gone in hot and strong for the battery set, but their combined belfries have provided lodging not for the bat, but for the small-capacity battery.

I cannot think of anything more stupid than to go on turning-out sets containing anything up to six valves and providing them with batteries that cannot possibly supply their needs. It is just as if motor-car manufacturers put on the road cars doing twenty miles to the gallon and furnished them with one-gallon petrol tanks.

It is a pity that the R.M.A. doesn't pay a handsome fee to some sensible person—me?—to introduce the requisite note of sanity when the new season's programmes are being reviewed.

Not My Ether Music

ALAN HUNTER'S article in a recent issue on "Music from Reaction" reminds me of an incident that occurred when this method of producing melodies made its first appearance some years ago.

A friend who knew that I was Thermion wrote me an ecstatic letter congratulating me on the use of my marvellous invention. Somewhat puzzled, I thought I would wait for explanations until next time I met him.

This happened a week or two later, and I asked what on earth he thought he was talking about. "But," he said, "the thing was invented by Thermion, and you are Thermion, aren't you?"

Then I saw daylight. Therlmin and Thermion don't look at all unlike in print, do they?

B.B.C. Modesty

ALTHOUGH the B.B.C. may not hesitate to blow its own trumpet in matters of policy, one can hardly accuse it of making an undue fuss of what is going on behind the scenes on the engineering and technical side of its activities. For instance, those respon-

sible for the maintenance and efficiency of the network of transmitting stations must be very stout fellows—deserving indeed of full marks in every respect—though one hears very little about them. They are left more or less to blush unseen even in the B.B.C. Year Book, where they might at least be given honourable mention.

The same modest obscurity surrounds the B.B.C. research staff, although they naturally enjoy special facilities not available to the general public. I am sure they must turn out some very good work, and we should all be glad to hear more about it.

A Mystery Effect

TALKING of this kind of thing I see that Messrs. Bailey and Martyn, of the Australian Radio Research Board have put forward a most ingenious explanation of an unusual form of interference—first reported from Holland some months ago—between the Luxembourg and Beromünster programmes. Listeners situated along a line joining the two transmitters observed that one station persistently modulated the other under circumstances which ruled out any possibility of the effect being due to ordinary overlap or lack of selectivity in the receiver.

It is now pointed out that when powerful waves, such as are radiated by the Luxembourg station, reach the Heaviside layer, they knock the free electrons about to such an extent that other normally-fixed electrons are shaken free, and so temporarily increase the conductivity of the layer in their track.

Consequently, when the Beromünster wave comes along it is modulated by "variable" absorption and the two waves become so firmly welded together that it is impossible to separate them at the receiving end.

The Thyatron

TAKEN all round, the thyatron promises to be one of the most valuable members of the ever-growing tribe of thermionic valves. It is a most delicately "triggered" tube which will pass a much larger current than the ordinary valve in response to a very small impulse applied to the grid.

Up to the present it has been used for a hundred and one different kinds of indicating, control and alarm devices, but I see it has now found a new application in cathode-ray television where it performs the very useful function of accurately timing the "saw-toothed" oscillations used for scanning the fluorescent screen both up and down and to and fro. Its particular merit in this connection is that, unlike the neon tube, it is possible to adjust the voltage at which a discharge takes place.

Are We Playing With Fire?

Continued from page 233

the human body if the exposure was too lengthy.

A whole line of martyrs suffered and contracted an incurable skin disease which comes from too great an exposure to the rays before the danger was realised and the necessary protective measures taken. In these days X-ray workers are adequately protected because the risks are fully understood.

And so this article may be taken as a suggestion that when working on new wavelengths we should be very careful what we do. Some waves go through brick walls without hindrance, some go round the earth, being reflected and refracted, others seem only to follow comparatively straight paths through space.

Some waves, again, cause the body of those in the vicinity of the transmitting apparatus to be raised in temperature, X-rays penetrate some substances and not others, enabling us

to take shadowgraphs; infra-red rays will penetrate fog at sea and enable photographs to be taken; ultra-violet rays make some substances glow with light which otherwise give no light in themselves.

Do not imagine that we have fully explored all these wavebands or that we are not liable at any moment to discover entirely new properties which may be very helpful or very harmful. The coal miner digging beneath the earth risks his life every day, for a blow of his pick may unexpectedly release several tons of rock and crush him to death.

Entirely New Phenomenon

The scientific worker in a laboratory, devising new valve circuits, changing this, shortening that, in order to get ever shorter and shorter wavelengths, may one day and without warning discover some entirely new phenomenon which may be beneficial or baneful. Who knows?

Think about it! You know the old Shakespearean tag, "There are more things—"

The 39/- Lucerne S.G. Ranger

Specially Designed for "A.W."

by *The Experimenters*

YOU have been waiting for this set, we know. That is partly because we have blown our own trumpet about it in previous articles, but partly, we imagine, because you have been building our specially designed components and now want to know what to do with them.

From our very heavy correspondence we are gratified to say that our coil has gone down amazingly well, readers having built it for all kinds of sets. The week before last, you remember, we tried to meet this avalanche of interest by telling you how to use the coils in typical home-constructor sets.

That article, we realised, did not fully meet the case. We have still to think of all those who have made up the coils without any intention of modifying existing sets to take them.

Using Home-made Parts

So, as promised, we are this week telling you how to make a very straightforward three-valver using the two coils, the home-built low-frequency transformer and two of the high-frequency chokes—the design for which was also given recently.

We do hope that many of you have taken the trouble to make up all these parts because

Features of the 39/- Three

- Screen-grid three-valver for which all the parts can be obtained for 39/-.
- Lucerne coils with extended wave ranges to cope with the new broadcasting plan.
- Variable selectivity without loss of volume.
- Large baseboard and panel so that there is no cramping of the parts.
- Extremely simple wiring that any beginner can follow without difficulty.
- Home-made coils, high-frequency chokes and low-frequency transformer—or they can be bought ready assembled if desired.
- Between thirty and forty stations at good loud-speaker strength with good quality.
- Large-scale blueprint on the inside cover this week.
- Photoplan wiring guide on page 241 of this issue.

if you have it will add to the fun of building this set—and when it is built you will have something that is very much your own making.

Let us tell you what happened before we designed this set. We have naturally had a lot of ideas about set designing, though we don't often get the chance to put them across in this or any other paper. For one thing the layout always seems to us to be something needing very special care if the design is to be published. What we mean is that in a set appealing to the masses the keynote

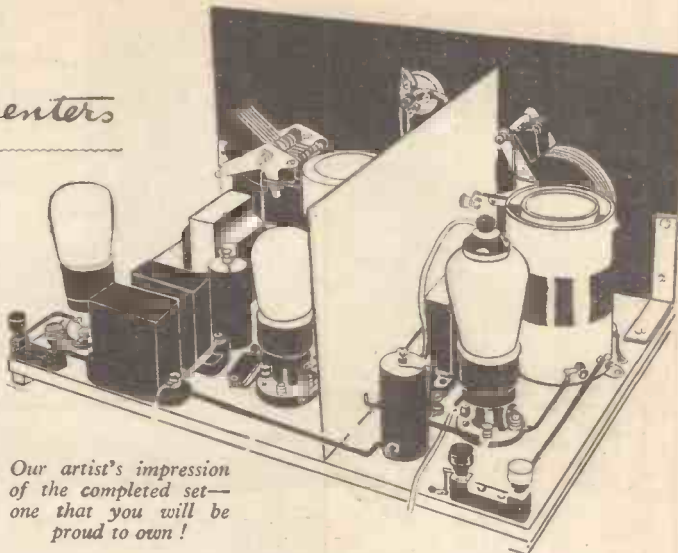
of the published layout ought to be utter simplicity.

A little experience of ours will emphasise what we are really driving at. A radio fan came along to the laboratory full of trouble as usual and wanted us to show him how to put in a pick-up. He said he could not follow the blueprint of the set—being rather a beginner at the game, of course—and he implored us to trace out the modifications needed.

Which we did. It was only after we had switched on the set with its additional gadgets that we realised that we ourselves had gone wrong and had mistaken the positions of power and detector valves. In other words, that blueprint had fooled even us.

So when we got right down to the design of this little set we determined to lay out the parts in such a way that an ultra-simple blueprint would be possible.

Our artist's impression of the completed set—one that you will be proud to own!



We wanted to make the set design so simple that anyone could tackle it with full confidence. What is more, we wanted anyone to be able to refer to the layout diagram without having to tear hair to see at a glance the positions of the components and their wiring connections.

We scrapped about three different layouts of the com-

ponents until we had arrived at one that gave us very straightforward point-to-point connections, aiming at the ideal of a complete set without any crossing wires. From the photoplan picture, specially prepared for us by an artist from our original photograph, you will possibly agree that we have been fairly successful in our aim. True, there are a few wires crossing, but they are so obvious that you could hardly make a mistake.

We would go so far as to say that this is one of the simplest layouts that have ever been published. If you want to make doubly sure of yourself you can obtain a blueprint, we understand, price one shilling post paid, from AMATEUR WIRELESS Blueprint Dept., 58 to 61 Fetter Lane, E.C.4.

Economy Pit Falls

Before we go any further into the design of the set, we might mention something about the cost. We realise that to-day it is very easy to build a wireless set, but it is not so easy to build a really first-class set at a low cost. Quite simple, of course, to go out and buy up very cheap and shoddy parts, assemble them into a set without any refinements such as decoupling—but that simply produces a nasty set, not a cheap one.

Now we do want to emphasise that our set, though only 39s., is really first rate. All the components in the design come up to a pre-determined standard of efficiency. We knew what we wanted, and went out to get the cheapest we could at that.

We have good quality tuning condensers of the air-spaced type, with very cheap valve holders giving perfectly sound contacts, and fixed condensers shorn of their trimming but nevertheless first class in performance.

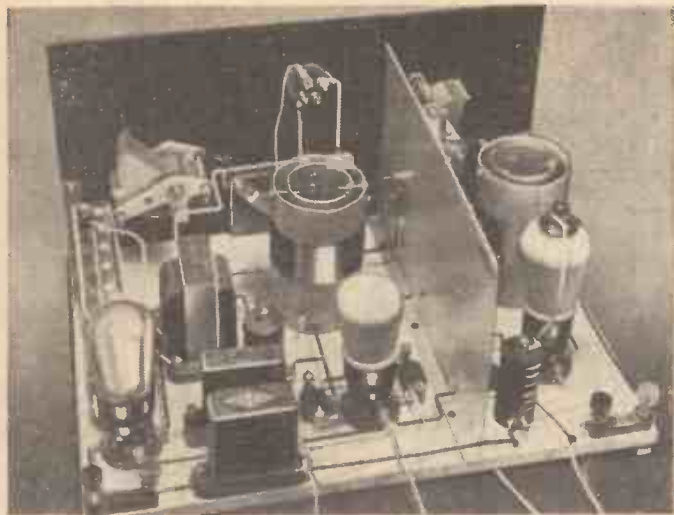
Pruning Cost Sensibly

Just an example of sensible economy: The fixed condensers of the small type used in this set cost 1s. when supplied with terminals, but you can buy them for the marvellously low price of 6d. with soldering tags instead of terminals. Then if you buy a couple of terminals at 1½d. for connections you save 4½d. per condenser. Perhaps you think this is niggling economy, but there are three of these condensers, don't forget, and that is the way to economise without sacrificing performance.



A member of the "Amateur Wireless" technical staff spends an enjoyable half-hour with "The Experimenters'" Lucerne S.G. Ranger. Here you see the set complete with valves in position—all ready for the aerial!

WITH OUR PHOTOPLAN and BLUEPRINT YOU CAN



Here is the 39s. Lucerna Ranger complete with valves and all ready for use. See the log of stations on page 242; an extended test report and full operating details will be given next week

Pursuing the economy idea, you know that in almost any set a grid leak and some sort of high resistance are needed. Normally these cost about 1s. each. We have found some that cost only 7½d. Again we save 9d. on the two.

When we come to the bigger parts, we have already told you how to build your own coils for 2s. 6d. each, high-frequency chokes for 1s. 6d., and an excellent little transformer giving good quality for 3s. 6d.

Performance Not Cheap!

So that you begin to realise that although this is an inexpensive set it is not "cheap" in performance. The economy is effected by careful buying and by building many of the key parts for yourself.

We don't want to overdo this economy campaign, though. That is why we have chosen air-spaced tuning condensers, for example. Further, our idea in designing this set is not *only* for economy's sake, but to prove what can be done in the perfectly straight-three line.

Now for a few words on the set's circuit. It is a straight screen-grid three, with a leaky-grid detector and a power-output valve. We have been asked by some people who have seen the set why we have gone in for an ordinary screen-grid valve.

Well, there are two good reasons. We know, for one thing, that a straight screen-grid stage gives more amplification than the average variable- μ . It is only when we want to use more than one stage that a variable- μ is really worth while—in our opinion, that is.

Secondly, there is the question of extra parts for the variable- μ such as the potentiometer volume control, and possibly a bypass condenser. In this set this would mean a minimum of 3s., and probably more.

You will want to know what we do about volume control. Actually we rely on reaction to boost up the weak stations, and as the coupling between the aerial and the coil is flexible the locals do not as a rule come in at overpowering volume

when reaction is at minimum.

Going on now to the detector stage, you see we have used the leaky-grid system, but as the amplification before detection is very high for one stage we have used a fairly low impedance detector—in order to handle the input without distortion. An impedance of 13,500 ohms is what we recommend as suitable for this stage. On no account go in for a high impedance type of detector or you will get quite appreciable distortion on all but the very weak stations.

Now about that power stage. Why a power valve and not a pentode? Here again we are going perhaps to shock some of you. We definitely believe that for such a set as this a power triode valve is preferable on all

accounts to a pentode.

In spite of all that has been said about pentodes they take quite a lot of juice. Nor is that all. You can get better quality with a triode valve with a running down battery than with a pentode.

Then again, with a triode you save the expense of a matching transformer or output choke. Tone correction is unnecessary and there again you save money on parts such as resistances and condensers.

In the transformer coupling you will note, or should, that we have included decoupling in the form of a 1-microfarad condenser and a 25,000-ohm resistance. Had you followed us from the beginning of our articles in this paper you would know why. You might like to read up that article on "Decoupling and All That," in the September 2, 1933 issue of AMATEUR WIRELESS.

Well, what's the reason? Although you can certainly cut out decoupling and not notice

any difference with a new battery, you find that when the battery is running down there develop all sorts of whistles and other instability.

Another point in favour of including decoupling—and hanging the expense—is that you can use the set with all types of mains units without any instability.

About the Construction

Well; that's about enough of the theoretical aspects of our set. We now want to tell you a few things about the construction. We have taken a lot of trouble to make the wiring very simple, and as you can see from the blueprint on the inside covers, the layout is really easy to follow.

If you can't get on with the job without a lot of palaver, you are not what we thought you were. No, but seriously, there is precious little that need be said. Just take a peep at the big photoplan illustration on this page—and see if you don't agree that it is the simplest thing in screen-grid threes you have ever come across.

As you can see, there is a metallised wood baseboard for mounting most of the parts. If you haven't such a thing, or cannot get one, you can use ordinary wood with aluminium foil—but the special type of wood is very convenient. Then there is a simple screen mounted vertically about two-thirds from one end of the baseboard, separating the high-frequency screen-grid stage from the detector and low-frequency stages.

Mounting the Ebonite Panel

The ebonite panel mounted at right angles to the baseboard is screwed in place with two wood screws and two angle brackets keep it firmly in place. A hint here. We bought a piece of ½-in. brass strip from Woolworth's, costing 2d. This we cut in half, and bent the two halves across a flat iron to make two angle brackets. Holes drilled in each arm for fixing—and thus we saved money again.

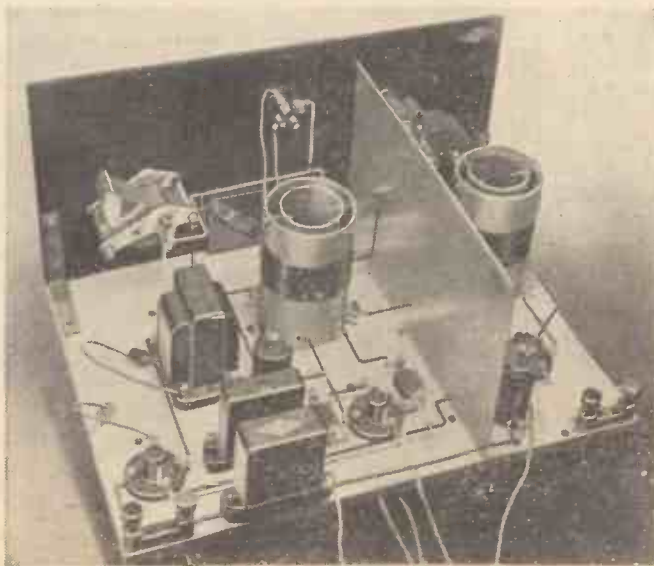
You might start by assembling your panel. On this there are the two tuning condensers, one for the high-frequency stage and the other for the detector. Note that these condensers are not mounted both the same way—the aerial condenser is mounted upwards so as to clear the metal partition.

Then there is a .005-microfarad reaction condenser of the mica dielectric type. Don't forget it is .005—not .003 or anything else. Finally there are three-point switches on the panel, one for wave changing of the two coils, and the other for switching on and off the high- and low-tension batteries. By the way, these switches cost only 10½d. each, so you needn't pay a lot more.

Then on the baseboard you mount everything else. Please yourself how. The order we went to work was this: first the coils, then the two terminal blocks, then the fixed condensers, then the valve holders, the high-frequency chokes and finally the low-frequency transformer.

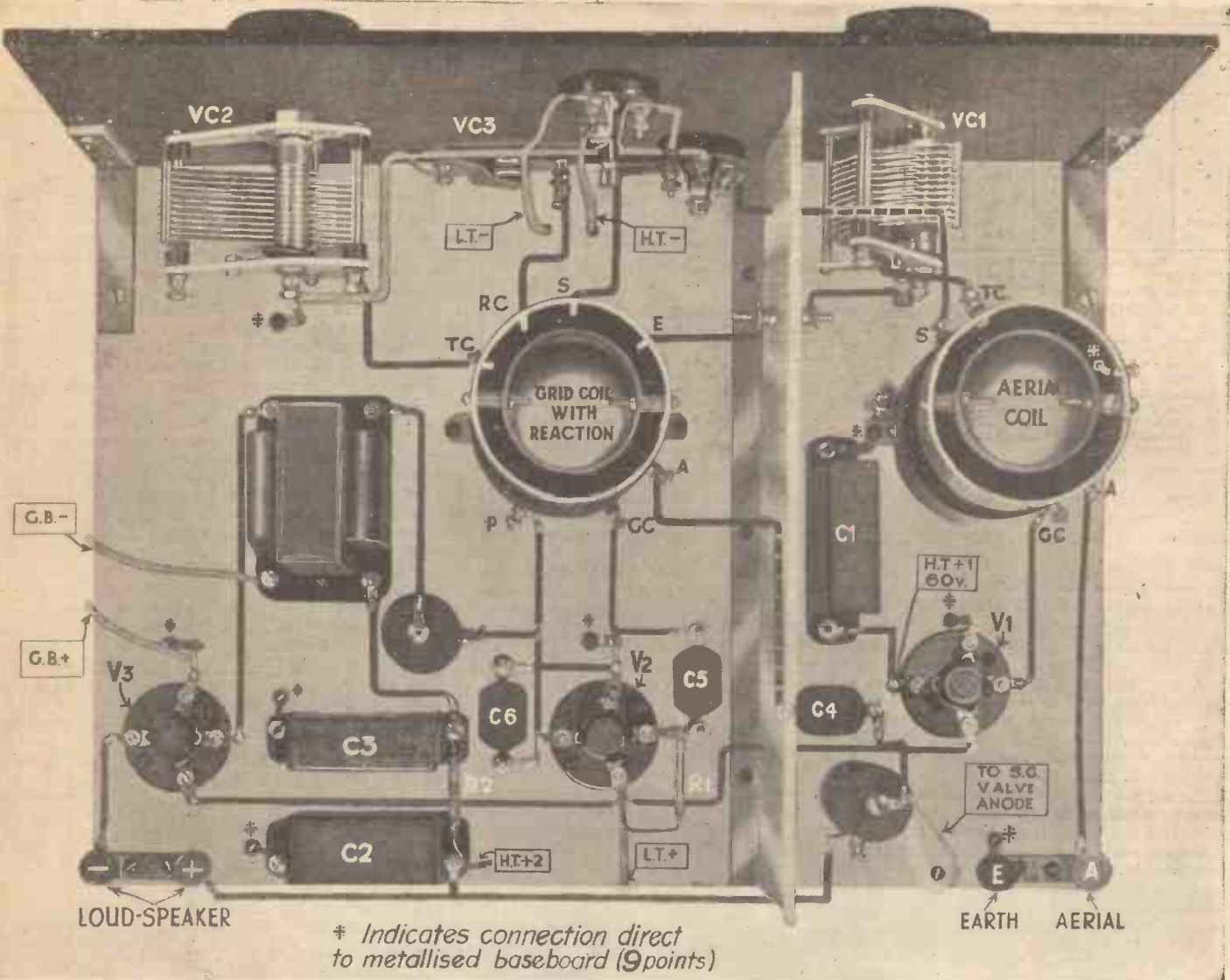
A little tip about those chokes. You simply drill a hole through the baseboard and push the fixing screw up through the bottom and finally screw the choke itself down on to the screw until it is tightly held.

Please don't fall into error over those coils. If you haven't made them and intend to buy them already wound, you need one aerial coil and one grid coil with reaction. The aerial coil has five terminals, and the



Another view of the set, showing its attractive appearance. It certainly does not look like a 39s. job!

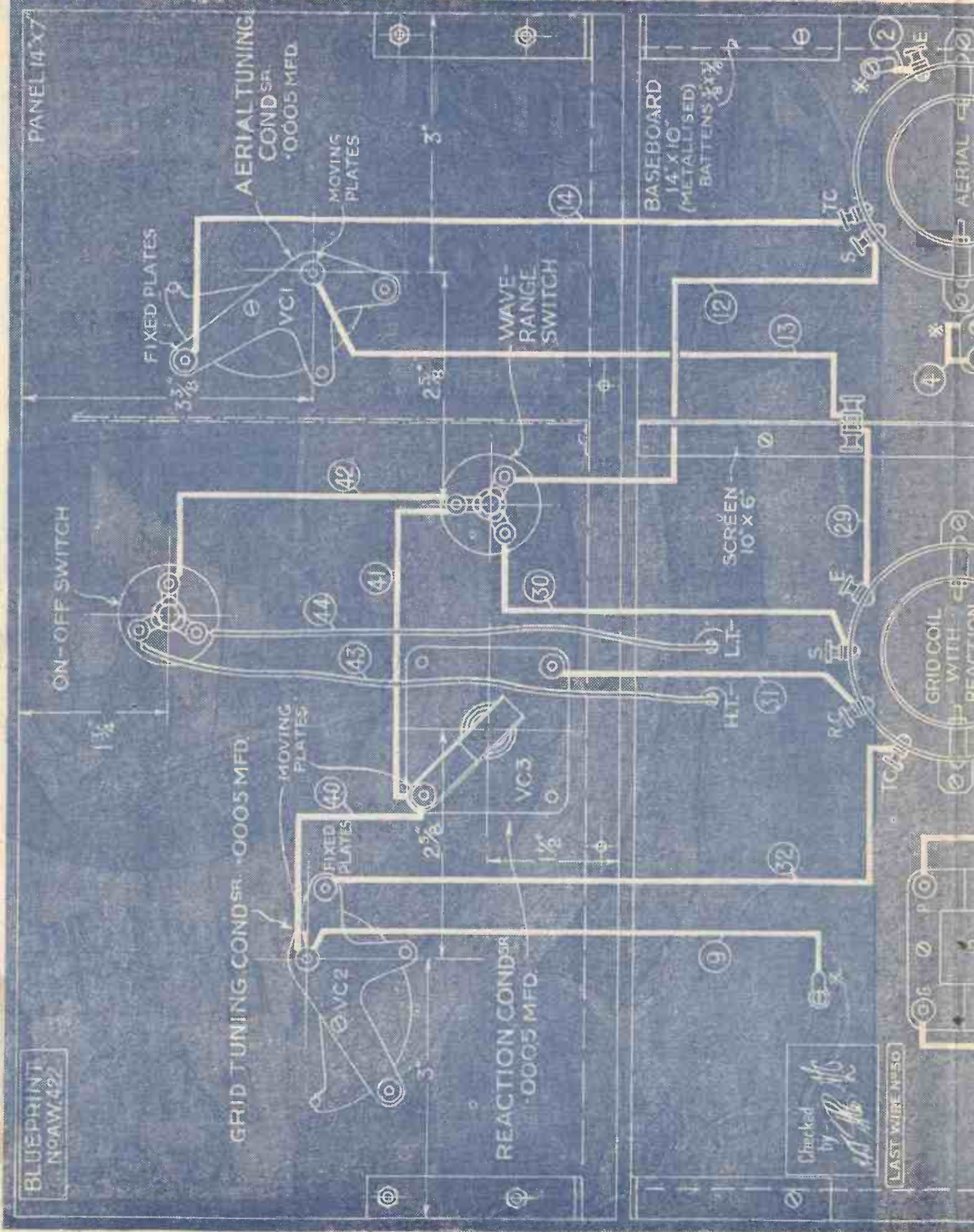
CANNOT GO WRONG with the LUCERNE RANGER!

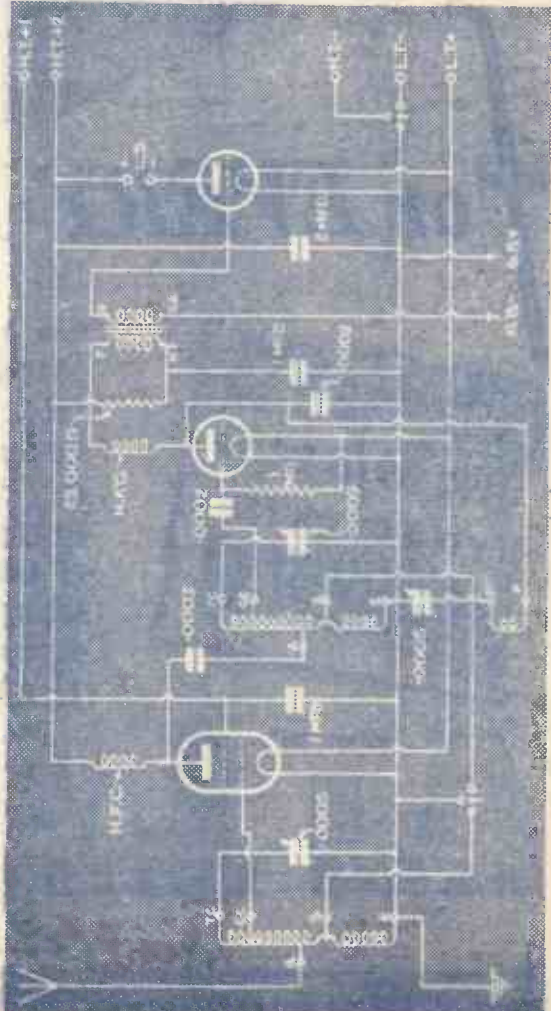
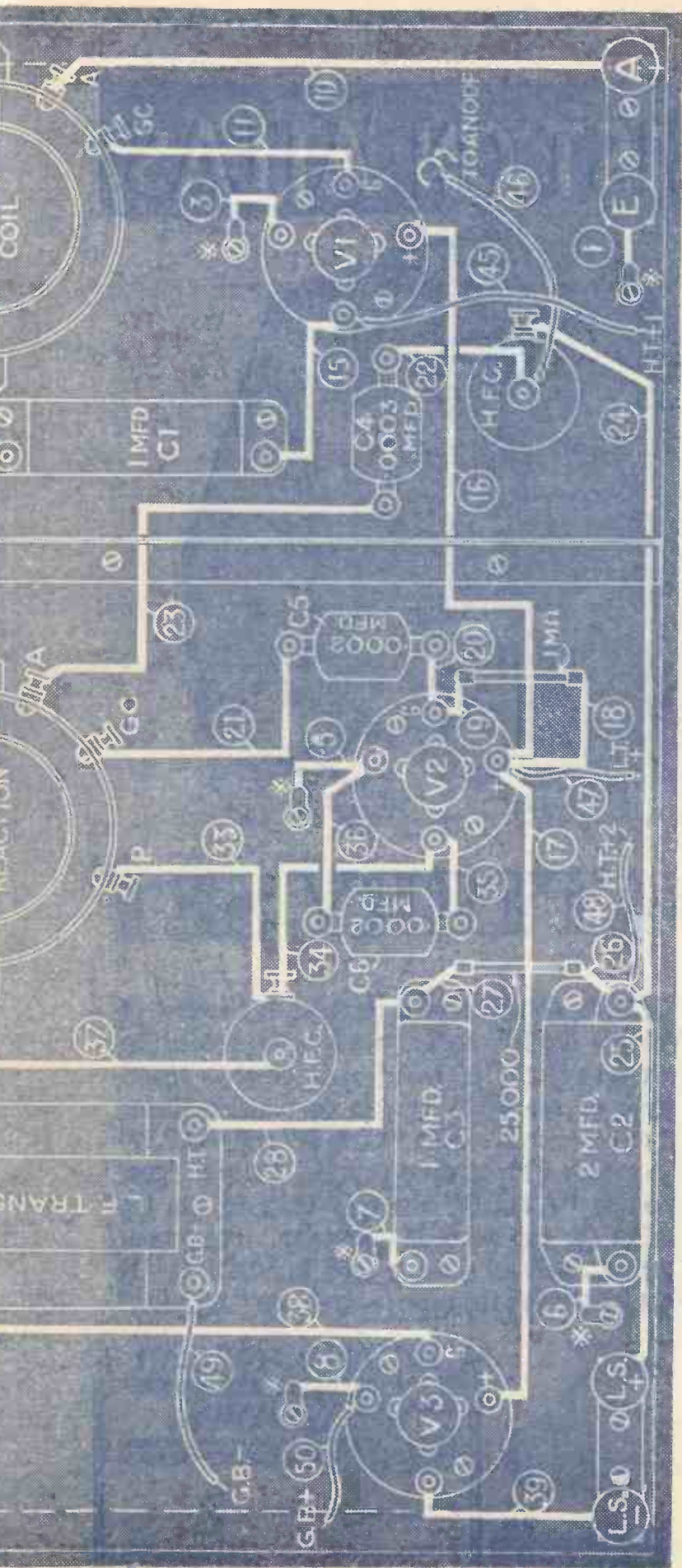


Your Point-to-point Wiring Guide

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| <p>WIRE NO. CONNECTIONS</p> <p>1.—Earth terminal on terminal block to metal baseboard.</p> <p>2.—ϵ on aerial coil to metal baseboard.</p> <p>3.—Negative filament of V_1 to metal baseboard.</p> <p>4.—Earth side of C_1 to metal baseboard.</p> <p>5.—Negative filament of V_2 to metal baseboard.</p> <p>6.—One side of C_2 to metal baseboard.</p> <p>7.—One side of C_3 to metal baseboard.</p> <p>8.—Negative filament of V_3 to metal baseboard.</p> <p>9.—Moving plates of VC_3 to metal baseboard.</p> <p>10.—Aerial terminal on terminal block to A on aerial coil.</p> <p>11.—Grid of V_1 to GC on aerial coil.</p> <p>12.—S on aerial coil to right-hand side of wave-change switch.</p> | <p>13.—Moving plates of VC_1 to screen.</p> <p>14.—Fixed plates of VC_1 to TC on aerial coil.</p> <p>15.—Anode of V_1 to C_1.</p> <p>16.—Positive filament of V_1 to positive filament of V_2.</p> <p>17.—Positive filament of V_2 to positive filament of V_3.</p> <p>18.—Positive filament of V_2 to R_1.</p> <p>19.—Grid of V_2 to one side of R_1.</p> <p>20.—Grid of V_2 to one side of C_5.</p> <p>21.—One side of C_3 to GC on grid coil.</p> <p>22.—One side of C_4 to top of high-frequency choke.</p> <p>23.—One side of C_4 to A on grid coil.</p> <p>24.—Bottom terminal of high-frequency choke to one side of C_2.</p> <p>25.—One side of C_2 to loud-speaker positive.</p> <p>26.—One side of C_3 to one side of P_2.</p> <p>27.—One side of R_2 to one side of C_3.</p> <p>28.—One side of C_3 to H.T. on low-frequency transformer.</p> | <p>29.—ϵ on grid coil to screen.</p> <p>30.—S on grid coil to left-hand side of wave-change switch.</p> <p>31.—RC on grid coil to bottom of VC_3.</p> <p>32.—TC on grid coil to fixed plates of VC_2.</p> <p>33.—P on grid coil to bottom of high-frequency choke.</p> <p>34.—Bottom of high-frequency choke to Anode of V_2.</p> <p>35.—Anode of V_3 to one side of C_6.</p> <p>36.—One side of C_6 to negative filament of V_2.</p> <p>37.—G on transformer to top of high-frequency choke.</p> <p>38.—G on low-frequency transformer to G of V_3.</p> <p>39.—Anode of V_3 to loud-speaker negative.</p> <p>40.—Moving plates of VC_2 to top of VC_3.</p> <p>41.—Top of VC_3 to top terminal of wave-change switch.</p> | <p>42.—Top terminal of wave-change switch to right-hand terminal of on-off switch.</p> <p style="text-align: center;">FLEXIBLE WIRES</p> <p>43.—Top terminal of on-off switch to low-tension negative.</p> <p>44.—Bottom terminal of on-off switch to high-tension negative.</p> <p>45.—Anode of V_1 to high-tension positive (60 to 70 volts.)</p> <p>46.—Top terminal on high-frequency choke to top of screen-grid valve.</p> <p>47.—Positive filament of V_2 to low-tension positive.</p> <p>48.—One side of C_2 to high-tension (120 to 150 volts).</p> <p>49.—G.B. negative on low-frequency transformer to grid-bias negative (4.5 to 9 volts).</p> <p>50.—Negative filament of V_3 to grid-bias positive.</p> |
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Layout and Wiring Guide for the Lucerne Ranger





**FULL CONSTRUCTIONAL DETAILS
APPEAR ON PAGES 239-242**

YOU CANNOT GO WRONG IN BUILDING THE SET IF YOU USE THIS BLUEPRINT AND THE SPECIAL PHOTOPLAN AND POINT-TO-POINT WIRING GUIDE TO BE FOUND ON PAGE 241 OF THIS ISSUE

PARTS NEEDED FOR THE 39/- LUCERNE RANGER

SUITABLE VALVES				
Make	Screen-grid	Detector	Power	Price
Cossor*	215SG	210Det	220PA	£ 11 3
Dario	TB422	PB172	TB062	1 2 0
Eta	BY6	BY1210	BX604	1 5 0
Hivac	SG210	D210	P220	1 1 6
Lissen	SG215	L2	P220	1 5 3
Marconi*	S23	L210	LP2	1 11 3
Mazda*	S215B	L2	P215	1 11 3
Micromesh*	5B1	HLB1	PB1	1 11 3
Mullard*	PM12A	PM2DX	PM2A	1 11 3
Osrarn*	S23	L210	LP2	1 11 3
Six Sixty*	218SG	210D	220PA	1 11 3
Triotron	S215	SD2	ZD2	1 2 0
Tungsram	S220	LD210	P215	1 5 0
362	SG2	L2	LP2	1 5 0

* Indicates B.V.A. Valves

Category	Item	Price
BASEBOARD	1—14 in. by 10 in., metallised	1 9
	2—As described in "A.W." for February 3	3 0
COILS	2—Lucerne aerial and grid types, as described in "A.W." for January 27	5 0
	2—0002-microfarad	1 0
CONDENSERS, FIXED	1—0003-microfarad	6
	2—1-microfarad	4 0
	1—2-microfarad	2 0
	1—2-microfarad	2 0

Category	Item	Price
CONDENSERS, VARIABLE	2—0005-microfarad, air dielectric	7 0
	1—0005-microfarad, reaction type	2 0
HOLDERS, VALVE	3—Four-pin	1 1 1/2
	PANEL	
	1—Ebonite, 14 in. by 7 in.	3 0
PLUGS, TERMINALS, ETC.	5—Wander plugs	5
	2—Spade terminals, marked L.T.	4
RESISTANCES, FIXED	1—25,000-ohm	7 1/2
	1—1-megohm	7 1/2
SUNDRIES	1 ft. brass strip	
	3 yds. thin flex	
	10 ft. insulated wire	say,
	4—Bolts and terminals	2 2 1/2
SWITCHES	1—Aluminium sheet, 10 in. by 6 in.	8
	2—3 in. dials	
TRANSFORMER, LOW-FREQUENCY	2—Three-point push-pull shorting	1 9
	1—As described in "A.W." for February 10	3 6
ACCESSORIES	BATTERIES	
	1—120-volt high-tension	11 0
	1—0-volt grid-bias	1 0
	1—2-volt accumulator	4 6

grid coil seven. If you mount these coils exactly as we have done, with the terminals in the same relative positions as ours, your wiring will be ultra simple.

Those Earthed Wires

And that brings us to this wiring job. Right away let us tell you about those little wires that don't seem to go anywhere. There are nine of these in this set. One on each valve-holder, one on each of the big fixed condensers, and one on the aerial coil—for example. These wires are all connected to the actual baseboard. All you do is to wind the end of the bare wire round the wood screw under a washer and screw it hard down into the wood, so that the wire makes good contact with either the metallised surface or the metal foil. As this is itself earthed, all these components are thus earthed too, and with the minimum of trouble. There are, though, two wires we did not treat this way. We refer to the connections for the two large fixed condensers. Here, before we screwed down the condensers, we put a short piece of bare wire under them, and then screwed the condensers hard down, thus leaving us with short connections already with one end earthed. The free ends then went round the adjacent terminals, as you will see if you look hard enough.

Now about the wiring in general. The wire we have used in our model is standard insulated tinned copper, but you can use No. 20 gauge wire in sleeving if you prefer that. Don't forget that when wires go through the screen partition you must be careful not to let the sharp edges of the clearance holes cut the sleeving—otherwise there will be a short, and the devil to pay.

Everywhere in our neat little set we have soldered. This is another fad of ours. You need not follow us. All the components have soldering tags as well as terminals, so please yourself. It certainly does make a neat job of the wiring if you solder—and after all soldering is really very easy. In fact we maintain that it is much quicker than laboriously tightening up looped ends under terminals—quite apart from the danger of breaking the internal

connections that this system so often involves.

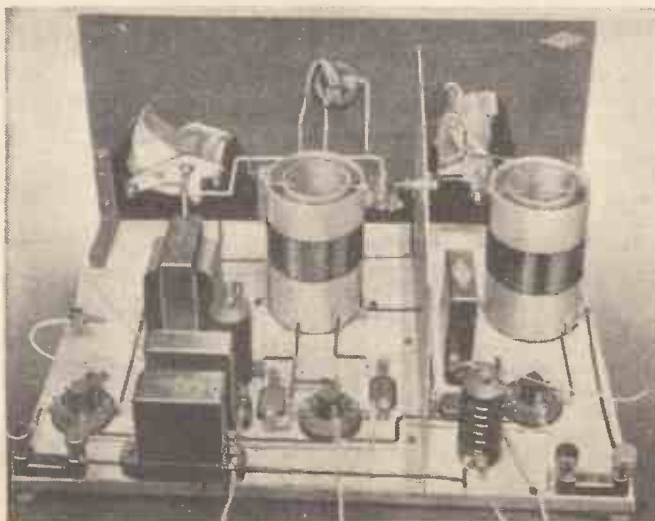
You will find an examination of the special photoplan a great help in this wiring process—almost as good as looking at the actual set.

A word or two on the coil connections. Take the aerial coil, for example, it has two terminals on one side and three on the other—one of the three being near the top of the coil former. This top connection goes to the fixed plates of the tuning condenser, while the connection right below it marked "switch" in our original drawings goes to one side of a three-point wave-change switch. The third connection on this side of the coil former goes directly to the chassis by a short wire taken underneath a wood screw.

Will you remember that when we refer to any coil markings we are referring to our description of the coils in AMATEUR WIRELESS, dated January 27, 1934.

The terminal marked A on the other side of the aerial coil former goes directly to the terminal marked "aerial." Of course if you want to use a preset condenser for reducing volume you connect it in series with this lead.

The terminal marked GC goes to the grid of the screen-grid valve-holder. That completes the aerial coil connections.



From this photograph of the Lucerne Ranger it will be easy to locate the positions of all the parts. Check up with blueprint on the inside cover and photoplan on page 241

Now look at the grid coil on the other side of the partition. On this there are seven terminals, four on one side of the former and three opposite. Take the first of the three marked P. This goes to the anode of the detector valve, and to the bottom end of the high-frequency-choke.

Then the second terminal marked GC goes to one side of the .0002-microfarad grid-condenser, and the third one marked A goes to one side of the .0003-microfarad coupling condenser on the other side of the screen.

Other Coil Connections

Now for the four terminals on the other side. The first one marked RC goes to the fixed plates of the right-hand variable condenser. The second one marked RC goes to the fixed plates of the .0005-microfarad reaction condenser. The third one marked S goes to either of the two spare points on the wave change, while the fourth terminal marked E goes to the terminal on the screen. Take care to get these right.

Well, that's the coil connections put right. Not much more to say, but perhaps a few remarks about selectivity and matching up of the coils for your conditions. From letters received some of you would seem to have misread our first remarks. The ten turns on the bottom of each coil can be varied to alter the selectivity. The variation of these turns does not, to any appreciable extent, alter the tuning range.

If you find the tuning is rather flat on the left-hand condenser take off a turn or two from the bottom of the medium wave winding, making it 8 instead of 10 turns, and this will sharpen up the tuning very much. The same

Results on Test

During a short test the Lucerne S.G. Ranger received the following stations at good strength:—

LONG WAVES.—Huizen, Radio Paris, Daventry National, Eiffel Tower, Motala and Luxembourg.

MEDIUM WAVES.—Munich, Midland Regional, Leipzig, Scottish Regional, Milan, Berlin, Strasbourg, London Regional, Hambourg, Breslau, Poste Parisien, West Regional, Genoa, Hilversum, North National, Heilsberg, Scottish National, Bari, London National, Frankfurt, Trieste, Nürnberg, and Fécamp.

An extended test report will be published next week.

idea can be applied to the right-hand coil—the grid coil for the detector.

On the other hand, if you live far from a local and want a little more pep, put on two or three turns on each coil. This is a matter for your own experiment.

Oh, by the way, during our very full tests of this little set we have been using with great success that W.B. Microloc permanent-magnet moving-coil loud-speaker. What a great boon it surely is to experimenters!

That's all for now. Next week we will tell you how to work the set and give you some notes on valves and batteries and other useful hints.

AMATEUR TELEVISION

You Can Take Up Television at Trifling Cost!

By H. CORBISHLEY

ARE you hesitating about taking up television reception because you are under the impression that it is costly and complicated? If so, your ideas are wrong, for it has become one of the cheapest of hobbies

little extra high tension. A photograph of a low-priced disc television receiver is shown below. Constructional details of this were given in the issue of "A.W." dated November 11, 1933. The cost, including the motor as shown, is only 50s. A blueprint of large-scale drawings can be supplied (price 1s.), so there will be no difficulty in building it.

Another disc receiver of the same type but with some additional refinements is shown by the second photograph. Full details of this are given in the March issue of *Television*. The refinements in this are adjustable lenses and a control panel and indicator lamp which will enable the speed of the disc to be accurately gauged. Don't imagine, however, that these refinements are essential; they merely add to the convenience of operating the apparatus. A full-size blueprint of this machine also is available.

Now assume that you have the machine, what is the next step in order to receive pictures? Tune in some night to London National when the television broadcasts are on. You will hear a loud humming noise which is quite unlike any other broadcast.

An Interesting Experiment

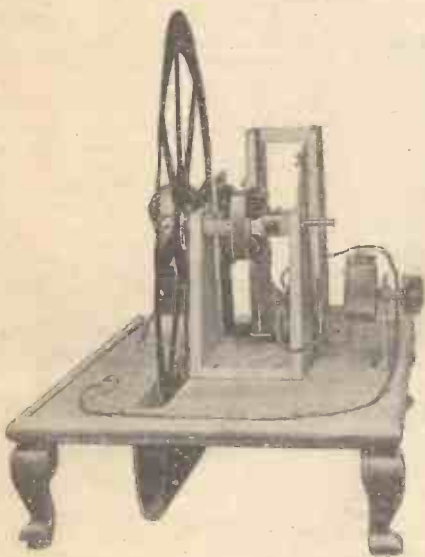
Even if you have not decided to build a machine, you can make a very interesting experiment. Get a neon lamp of the kind that are used for shop-window displays; these go by the name of "Beehive" and cost about 3s. 6d. Connect this in place of your loud-speaker, when, if your high tension is sufficiently high, it will light up and you will notice it flickering when a transmission is in progress. If the lamp does not strike or light up, then it is because the high tension is too low. There are several ways of adding to this, one of which is shown by the accompanying diagram.

Now, in this flickering light we have the whole kernel of simple television reception, for all that remains to be done is correctly to place the flickering light at any given instant in a certain position and this the revolving disc does automatically, provided that its speed is correct.

tension and current for driving the motor. It is quite practicable to obtain the high tension from batteries, and as the power requirements of the motor are only small, this can be run from an accumulator. It will be clear then, that nobody is really debarred from taking up television.

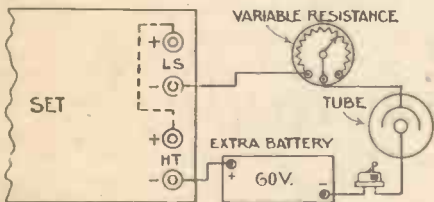
Distant Reception

Those who live at considerable distances from the London National transmitter may wonder if successful results may be obtained. Usually, distance means that there will be a certain amount of fading and this will result in a picture that is not consistent during the whole of the broadcast, the probability being that at times it will be quite clear and at others somewhat faint. Whether this is a really serious disadvantage must be decided by the experimenter, but it may be remarked that severe fading is not likely to be troublesome at distances less than a matter of two hundred miles.



Here is a disc receiver which can be built for 50s. and is guaranteed to give excellent results

and the apparatus is of the simplest character, which can be had at very low prices. To get down to facts, it is possible to build a television visor for a matter of a couple of pounds or



This is a simple method of adding to the high-tension voltage

even less if you can press into service some odd motor which may be available.

The principal cost of the gear is the motor, and we know of many amateurs who are getting excellent results using fan or hair dryer motors, etc. Deduct the cost of the motor, therefore, and the cost of the remaining apparatus becomes a matter of a few shillings, for all it need consist of is a scanning disc, a neon lamp and a couple of lenses.

For the wireless side of the apparatus you can use your existing receiver, and provided that this will give good loud-speaker strength, the only addition that may be needed is a



A receiver incorporating a number of refinements which will make for easier operation

Now what about the results that may be obtained with such simple apparatus? The picture that is actually seen is approximately 3 in. high; it is reddish in colour and the detail is sufficient to allow of the artists being easily recognised. Much, of course, depends upon the manner in which the set is operated and though actually it is very simple, there is a large amount of fascination in securing the best results which makes a very real appeal to the experimenter.

The fact that the B.B.C. has not stated its policy with regard to the future of the television transmissions has undoubtedly caused a number of people to hold back. We are, however, promised a continuance of the 30-line transmissions and it should not be overlooked that at the present time a new studio is being equipped solely for television. Research work is also to be conducted at the new quarters of the Engineering Research Department.

A TELEVISION SECRET REVEALED
FULL DETAILS OF THE SCOPHONY PRINCIPLE IN THE MARCH ISSUE OF "TELEVISION"

It will have been appreciated that mains supply is an advantage when it is wished to participate in television broadcasts, but it should not be assumed that mains are absolutely essential. There are two requirements, of course—the provision of adequate high

Conducted by J. H. Reyner, B.Sc., A.M.I.E.E.

Our Tests of New Apparatus



Two T.M.C. fixed condensers made under Hydra patents

T.M.C. HYDRA CONDENSERS

TWO condensers manufactured by T.M.C. under the Hydra patents have recently been received for test purposes. These are supplied in metal cases, the top of which is formed by a piece of bakelite.

Two soldering lugs are provided for connecting purposes, and fixing lugs are provided at the base of the case, the overall sizes being 2 3/4 in. by 2 7/8 in. high.

Test Results.—On test the measured capacities were found to be 1.9 microfarad and .12 microfarad. These compare favourably with the figures quoted by the manufacturers, which are 2 microfarads and .1 microfarad respectively. The condensers safely withstood a voltage of twice that of the rated working value, and no sign of breakdown was observed.

We understand that connecting terminals can be fitted in place of the soldering tags at no extra charge, and also that a twelve-months guarantee is given with each condenser.

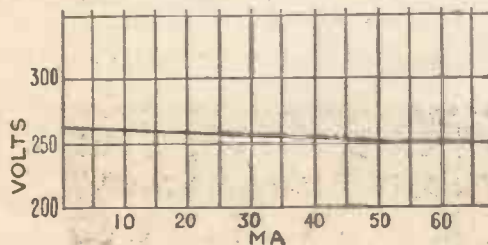
There is one point in which we consider improvement can be effected. We would suggest that some form of dampproof sealing be adopted at the top of the condensers, as there is some possibility of moisture affecting the insulation, otherwise they should prove entirely satisfactory. **Makers:** Telephone Manufacturing Co., Ltd.

Price: 2 microfarad 3s., .1 microfarad, 1s. 6d.

MULLARD PEN4VA VALVE

THE Mullard Pen4VA valve is an indirectly-heated output pentode claimed to be capable of delivering an undistorted output of 3.4 watts for a comparatively small peak voltage input of 15.5 volts.

The electrode construction is of the usual type, the only variation being that the elements are supported at the top by an additional



Voltage-regulation curve of Bryce Junior mains transformer (see report in last column)

pinch which takes the form of a glass bar. The valve is very lightly "gettered" and the electrode construction can plainly be seen.

Test Results.—The characteristics of the valve were found to be substantially in agreement with those quoted by the manufacturers. Under test we were able to obtain an output of 3.175 watts with 15.2 volts peak input before any overloading was observed on a cathode-ray tube. These figures were obtained with an approximate anode load of 6,000 ohms.

It will be seen, therefore, that the valve is suitable for incorporation in circuits where a large power output is desired with a small sacrifice of sensitivity.

Working figures for the valve were as follows:—

Filament volts	...	4
Filament amperes	...	1.5
Maximum anode volts	...	250
Average anode current, milliamperes	...	32
Maximum screen volts	...	250
Average screen current, milliamperes	...	12
Grid bias, for maximum anode and screen volts	...	22
Optimum load, ohms	...	6,000
Bias resistor, ohms	...	500
Maximum anode watts	...	8

The valve is supplied mounted on the standard seven-pin base. **Makers:** Mullard Wireless Service Co., Ltd. **Price:** 18s. 6d.

CENTRALAB RADIOHM VOLUME CONTROL

THE new Centralab Radiohm volume control is now available in values from 5,000 ohms to 1 megohm. These instruments can be obtained with or without switches and are extremely compact.

The resistance element is of the graphite composition type deposited on a strip of insulated material which fits inside the body of the volume control. Contact is made by a band of springy metal inside which a

permanently lubricated button moves round and presses the contact strip against the resistance element, thus avoiding any rubbing contact.

Soldering tags are fitted for connection purposes, and a 3/8-in. hole is all that is required for fixing to the panel. A long spindle is provided with a flattened edge which can be cut off to any desired length and a large knob is also provided for control purposes.

The volume control is fitted with a dust-proof cover, and as the overall sizes are only 1 1/8 in. diameter by 3/8 in. deep, it will be realised that this is an extremely compact unit.



Centralab Radiohm volume control, of very compact design

Test Results.—The sample submitted, which was rated at 50,000 ohms, was found to have an actual value of 52,000 ohms, this representing a variation of only 4 per cent., which is well within the manufacturers' rating of + or - 20 per cent. The resistance itself gave even variation over the whole of its contact area.

In operation the volume control was found to be exceptionally free from noise and gives every indication of being perfectly satisfactory in use. For readers who have been troubled with noisy volume controls, the Radiohm should prove an ideal solution.

Distributors: Rothermel Corp., Ltd. **Price:** 3s. 9d.

BRYCE MAINS TRANSFORMER

A NEW addition to the range of transformers marketed by Andrew Bryce & Co. is the Junior type.

It is designed for full-wave valve rectification. The high-tension secondary output is 250-0-250 volts at 60 milliamperes. Two low-tension secondary windings are provided, one giving 2-0-2 volts at 1 ampere for heating the rectifier valve, and the other giving 2-0-2 volts at 3 amperes for the heaters.

The transformer is strongly made. The primary winding is tapped for mains voltages of 220 to 230 and 240 to 250.

Four aluminium brackets are provided for fixing, and the dimensions are 5 3/4 in. by 2 1/2 in. by 5 in. high.

Test Results.—The transformer was tested with a 250-volt 50-cycle input and the output of each secondary was measured whilst under various loads.

The centre taps were all found to be reasonably accurate, and even on full load the transformer was free from mechanical buzz or hum. No appreciable heating was observed.

As will be seen from the curve, the transformer has exception-



Bryce Junior type mains transformer

ally good voltage regulation—the no-load rise being of the order of 5 per cent.

The general construction of the transformer is sound, and the unit can be thoroughly recommended.

Makers: Andrew Bryce & Co., Ltd. **Price:** £1 17s. 6d.

What's New in Radio?

FERRANTI are manufacturing a new range of resistances and condensers. The .5-watt fixed resistances are of the tubular type, the resistance element being sprayed on at high temperature. It is claimed that these resistances are noiseless in operation. They are available in the usual values—with wire ends at 6ft and with terminals at 1s. The wire-end type is marked in the standard colour code. Condensers of the following types are also available—high-voltage

electrolytics of 6, 8 and 8+8 microfarads, low-voltage 25- and 50-microfarad, and paper types in values from .01 to .5 microfarad.

A new high-tension battery has been introduced by Ever Ready. It is designed for the McMichael Lodex 5. The voltage of this battery is 126, including 6 volts for grid bias. The price is 17s. 6d. and the list number W1252.

Another new battery. This one is a Drydex priced at 16s. It is a 132-volter suitable for the Philips 834B receiver. The type number is H1088 (of the yellow-triangle series).

Replacement scales for Ekco

models SH25, C25 and RG25 are now available from all Ekco dealers. These scales will be supplied in pairs of two sections (9d. per pair).

The new Ultra model 22 has many interesting features. Firstly the set is equipped with clock-face tuning, that is, the wavelengths are marked round the dial like the figures of a clock. The set has full automatic volume control, a tone-control switch and an energised moving-coil loud-speaker. Provision is made for connecting external loud-speakers. A wavelength chart is supplied in a shallow drawer in the base of the receiver to facilitate easy identification.

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PASSENGERS!
with the
LISSEN
SKYSCRAPER 4



FAIR WEATHER OR FOUL—NEVER LOST TOUCH IN 16,000 MILES VOYAGE!

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Mr. Ford, a ship's wireless operator, took a Lissen Skyscraper 4 with him on a voyage from England to Burma and back. The distance was 16,000 miles and Mr. Ford reports the remarkable fact that "The Skyscraper kept me continually in touch . . . in fair weather and foul . . . in the Bay of Bengal demonstrated the Skyscraper to interested passengers who were most pleasantly surprised to learn that such results were possible on the loud-speaker at that distance—about 7,000 miles." Mr. Ford, in all

weathers and all climates, enjoyed uninterrupted world-wide reception on the Skyscraper. You, in your own home, can receive news and views and entertainment on long, medium, and short-wave stations from England, Europe, America, Australia, India, and Africa—and every programme on a full-power moving-coil loud-speaker, driven by double-balanced pentode valves, which give delightful brilliance of tone to the set.

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How to Build the Skyscraper—FULL INSTRUCTIONS FREE!

Chassis Kit, complete with 4 valves, £5 12 6

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The full instructions which enable you to build this set are obtainable without cost or obligation. Until you see this Instruction Chart of the Skyscraper you have no idea how easy it is to build the All-Wave All-World Skyscraper. Just post the coupon on left and a copy of these Instructions will be sent without any obligation on you to build the set. But when you have studied it, you will see that here is a wonder-receiver which has been placed by Lissen within reach of your purse and of your skill—and you will not easily resist the thrill of the Skyscraper! Post the coupon to-day!

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Advertisers Appreciate Mention of "A.W." with Your Order

Criticisms by WHITAKER-WILSON

My Broadcasting Diary



Collins photo
Reginald Purdell

Monday

VERY pleased with *Love Needs a Waltz*. Of opinion it needs anything but a crooner. Congratulations to Kenneth Leslie Smith its composer, and to James Dyrenforth, its librettist. Some admirable satire against American style of broadcasting. Definitely one of the best shows of its kind. Hope these two will get together again.

Tuesday

Considerably surprised to-night. Wondered whether *The Farmer's Wife* would make much of a broadcast, especially the second act where half the fun used to be the dresses of the country folk in the original production.

Came to the conclusion the dialogue must have really been good stuff or it wouldn't have stood so well divorced from scenery and costumes. That might be said of any adaptation, but considering how lightly this play is written I think it good testimony to its technique. Very pleased with it.

Wednesday

Had a shot at getting North Regional to-night to hear relay from Pavilion Theatre, Liverpool. Not very successful. Seemed to get unwanted noises out of the Mersey or somewhere.

Judging by reception accorded some of the artists, think the show must have been good. Why not relay one for us down here?

Schnabel played a piano concerto of Brahms which I have always disliked. As he nearly

made me like it I hope he will take it as meaning his pianism won me.

Good test, that. If a man can make you like a work for which you have really no use he must be good.

Thursday

Quite a showy vaudeville to-night.

Laughed at some of Collinson and Dean, but yawned when one of them said sometimes he sat and thought—sometimes he just sat. Perhaps they originated that funny saying? If so, they must be very aged.

Mabel Constanduros and Reginald Purdell in the tram scene, very good. Mabel getting almost a ventriloquist.

Very pleased with Maurice Elwin. He says he's the Monarch of the Microphone. All right. I'll give him the point because he really sang.

Any of those songs could have been crooned. Maurice proved that crooning isn't necessary. (Don't suppose anyone really ever thought it was, though).

Reminds me. Point against the Moderniques. Nice voices they have. Good diction have they. Why must any one of them croon when it comes to his solo bit?

Ronald Frankau amusing. Never heard him funnier. Good satire can't be beaten.

Don't care what you say. That song "They Ought to Make Up and be Friends" (or words to that effect) is a classic. Ronald must repeat it with new lines for next time. First-rate.



Maurice Elwin

Friday

I like the Pro Arte String Quartet. So much that I really did wonder why they took the trouble to play that unpleasant work of

Béla Bartok—anyway that's my opinion. Switching into the middle of it, I thought for the moment that all four of them were ill. Ridiculous to take that sort of stuff seriously. Won't, either.

Turned volume control down until the "all clear" sounded in audience. Then up for the sublime Debussy Quartet. Slow movement, with the mutes on, simply superb. Responded to every bar of it and went to bed satisfied there is some beauty left in modern music.

Saturday

"In Town To-night" passable. Some of it a bit fatuous, but the talk on the Indian earthquake, and that by the unemployed Lancashire man made me think a bit.

Delighted with dear old Sir George Henschel. Hope I sing Schubert like that when I am eighty-three. He sounded very young. Dare say he is in heart.

Croonerless vaudeville from St. George's. Everybody sang as though they weren't ashamed of being able to.

Alec Pleon very amusing and new in style. Like to have him again.

Sam Mayo might have been funnier. "Baby" rather a silly song. Have heard him better than this.

Ben Osborne and Nellie Perryer very good.

A tendency to be a bit broader in vaudeville lately. Do we really need broad humour? Lines are slipping through here and there. Do something about it, someone!



Collins photo
Ronald Frankau

A New Tuning Coil

AERIAL-COUPLING variations without changes in the setting of the tuning condenser—that is what you can get with a new Varley coil unit, if the makers' claims are justified.

We all know that a pre-set condenser in the aerial lead will give us a variation in aerial coupling, but it is also known that this system entails a re-adjustment of the tuning every time coupling is altered.

It is to overcome this drawback that Varley's have developed a sort of permeability tuning coil, called the Bi-focal coil-focusing unit. The outward design of the coil can be seen from the illustration. There are two tubular formers, 2 1/4 in. long by about 3/4 in. diameter, mounted 3/4 in. apart, with small lengths of high-frequency iron moving up and down them by pulling or pushing the little control knob at the front.

One of these coils is for long waves and the other for medium. The usual tuning condenser is needed, as the permeability variation is applied to the aerial coupling, and not to the idea of ousting the tuning condenser.

The aerial coil, either medium- or long-wave winding, is well tapped down at the earth end,

and the movement of the iron inside each coil varies the coupling between the portion of the coil in the aerial and earth circuit and the whole coil tuned by the variable condenser.

As you may know, the insertion of a piece of iron inside the high-frequency coil has the effect of concentrating the flux or lines of force on that part of the coil enclosing the iron.

If the iron is at the earth end of the coil, for example, the flux will be greatest there, and so will be the coupling effect. As the iron is moved away from this end of the coil, thus

shifting the incidence of maximum flux density, the coupling between the aerial portion and the whole coil coupling will be weakened.

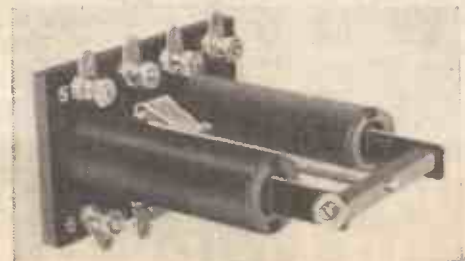
The point is that although this shifting of the flux from one part of the coil to another alters the coupling, the inductance of the coil as a whole is unaltered—as the iron remains inside one part or other of the coil all the time. The result is that the tuning is unaffected when the coupling is varied.

Reaction windings are specially disposed so that when the coupling is altered the reaction coupling is compensated, thus giving a more or less constant reaction effect.

Another good design point is that the amount of iron has been so chosen that the maximum coil efficiency has been obtained compatible with coupling variation requirements.

Altogether a coil development of possibilities. We have not yet tried out the system, having only just received an advance specimen of the coil unit, which appears to be very well made in the best Varley tradition.

The price of this Bi-focal coil-focusing is 10s. 6d. and the makers are Varley (Oliver Pell Control Ltd.) of Kingsway House, Kingsway, W.C.2.



Compact construction is a feature of the Varley Bi-focal coil-focusing unit



39/- LUCERNE RANGER



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If Peto-Scott Permanent-Magnet Moving-Coil Speaker required add 12/6 to Cash Price or 1/2 to each monthly payment.

NEW W.B. P.M. MICROLODE PERMANENT MAGNET SPEAKER, complete with switch-controlled multi-ratio input transformer. Cash or C.O.D. Carriage Paid, £2/2/0
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Recommended PETO-SCOTT SPEAKER, if required, add 22/6 to Cash Prices or 2/- to each monthly payment.

PETO-SCOTT, 30 Ratio-EXTENSION SPEAKER

Suitable for 1,001 Receivers including Class "B", Q.F.P., Super-power and Pentode output. Instantly adjusted ratios. Cash or C.O.D. Carriage Paid, £2/6. Yours for 2/6. Balance in 6 monthly payments of 4/6.

2/6 DOWN

KIT "A" CASH OR C.O.D. Carriage Paid 39/-

SEND 5/- ONLY

KIT "A" Comprises the Kit of Parts as detailed, less Valves, Cabinet and Speaker. Cash or C.O.D. Carriage Paid, £1/19/0.

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KIT "B" As for Kit "A" but with valves only. Cash or C.O.D. Carriage Paid, £3/10/3.

Send only 6/6

Balance in 11 monthly payments of 6/6

KIT "C" As for Kit "A" but with valves & Peto-Scott Lucerne Cabinet. Complete with B.A. Cone speaker. Cash or C.O.D. Carriage Paid, £4/12/9.

Send only 8/6

Balance in 11 monthly payments of 8/6

★ IF Ready-assembled coils, H.F. choke, and L.F. Transformer required with kit in place of parts for same as detailed in list of parts, add 5/- to Cash or C.O.D. Prices, or 6d. to each monthly payment.

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As described in "A.W." January 27, 1934

Complete kit comprising 2 ready-drilled Formers, 2 Reels of enamelled Wire, 6 B.A. Terminals, Nuts and Screws. Exact to specification for Aerial or Grid Coil. Postage 6d. extra.

2 Complete Kits for both Aerial and Grid Coils, 5/-. Postage 6d. extra.

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A.W. 3/3/34

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	£	s.	d.
1 Metallised baseboard, 14 by 10	1	3	
2 H.F. choke kits as in "A.W." February 3	3	0	
2 Lucerne coils as "A.W." January 27	5	0	
2 .0002-mfd condensers, type 665	1	6	
1 .0003-mfd condenser, type 665	4	0	
2 1-mfd condensers	2	6	
1 2-mfd condenser	6	0	
2 .0005 mfd, variable condensers, air dielectric	2	0	
1 .0005 mfd. Reaction condenser	1	11	
3 4-pin valve holders	7	6	
5 Wander plugs	7	6	
2 Spade terminals	1	0	
2 Terminal blocks (with terminals)	7	6	
1 Resistance 25,000 ohms	7	6	
1 Resistance 1 meg. grid leak	1	0	
1 Wood panel, 14 by 7 (plain)	1	0	
2 3-inch dials	1	9	
2 3-point push pull switches	3	6	
1 Transformer kit as "A.W." dated February 10			
Aluminum for screen, 10 by 6 in.; Brass strip for bracket (6 by 1/2 by 1/2 inch); 6 bolts & terminals			
Wire screws flex etc.	2	3	
KIT "A" CASH or C.O.D. Carriage Paid	£1	19	0
Set of 3 Specified Valves	£1	11	3

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Carriage and Packing 2/6 extra. Baffle-baseboard Assembly, 3/6 extra.

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Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

French Broadcasting By Jay Coote

ON the medium waveband, although general conditions are fairly satisfactory, there have also been a number of unwarranted deviations which do not tend to an improvement. There are very bad patches in some of the sections.

We still find French stations arbitrarily adopting channels to suit their own local conditions; Grenoble P.T.T. is an example. It has reverted, after a short spell, to its old wavelength of 569.3 metres; Nice-Juan-les-Pins has stepped into the seat which had been reserved to Luxembourg, and Radio LL, Paris, also has moved to 360.6 metres, just above Berlin-Tegel. Radio Normandie (Fécamp) on the other hand, to its credit has settled down on one of the French common waves.

Actually, the only invader of private property is the Hungarian relay Nyiregyhaza which, during the past week or so, has been transmitting on the channel exclusively given to Belfast (267.4 metres). Certain changes of channels have been made by the Spanish stations, but they have not affected matters in any degree. No, but little adjustment is required in this band to make everybody quite comfortable; it is the long channels only which cause anxiety.

The recent political upheaval in France and the consequent change in cabinets may seriously influence the carrying out of the reorganisation of the broadcasting system; at least, if it does not put a stop to some

of the constructions, it may delay them. As it is, some of the French papers have already paved the way by stating that, contrary to rumours, one or two of the stations which were expected to be brought into service at a fairly early date may not be heard before the end of the year.

P.T.T. Lyons and its colleague, Toulouse, in the same network are being hurried forward and should be ready by July, in time for the National Fête on the fourteenth of that month, but Paris, Marseilles and the new station at Nice (which will throw Juan-les-Pins into the discard) may not appear on the scene before late in the autumn.

French Regional Programmes

The high-power Paris station which is to replace the Ecole Supérieure, and is now being built at Villejuist, will take the French regional programmes as against the national entertainments to be broadcast by Radio Paris; the former, when completed, will be of a power of roughly 120 kilowatts, and is planned on the same lines as the Poste Parisien and Radio Luxembourg stations.

For the present, the alternative programmes are being given nightly through Radio Paris and the smaller Ecole Supérieure station.

Bordeaux Lafayette, of which the signals seem to have been louder since its change in wavelength, was closed down for five days from February 20 in order to make some alterations to the plant; in addition, during this period the height of the masts was increased to 330 metres, and no doubt you will now notice that the transmissions have actually gained in power.

MICROLODE MATCHING FOR PERFECT BALANCE

Seventeen ratios for power or pentode valves, and four for Class B, Q.P.P. or push pull all on the one speaker. Accurate adjustment of load impedance by the simple setting of a switch.

By introducing this unique feature W.B. engineers make possible an accuracy of adjustment which must improve performance.

Nearly every leading technician has signified wholehearted approval of this new and extraordinarily efficient range of speakers. Users everywhere write in enthusiastic terms of the improvement a "Microlode" has brought to their sets.

Since last autumn Microlode speakers have been specified as first or sole choice in practically every published constructor receiver. Hear one on your set to-day. You will be amazed at its performance.



30% stronger than a good cobalt steel magnet of equal weight. The crisp attack, excellent sensitivity, and surprising freedom from resonance are directly due to the unique properties of this exclusive W.B. magnetic system.

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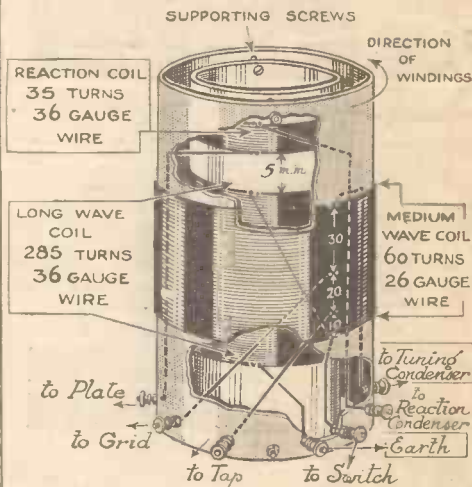
Whiteley Electrical Radio Co., Ltd.,
Dept. A., Radio Works, Mansfield, Notts.

Sole Agents in Scotland: Radiovision, Ltd., 233, St. Vincent St., Glasgow, C.2.

Sole Agents in I.F.S.: Kelly and Shiel, Ltd., 47, Fleet St., Dublin.



Lucerne Coils



Winding details of the Lucerne grid coil with reaction. Note the positions of the "Switch" and "Earth" terminals

THERE seems to be a little confusion regarding the connections of the windings on the Lucerne grid coil with reaction, described by "The Experimenters" in our issue of January 27. The diagram reproduced above shows the proper connections.

It will be remembered that recently "The Experimenters" explained how to add the new Lucerne coils to the Cossor Melody Maker and the Mullard Master Three. Quarter-scale wiring guides were reproduced in "A.W." dated February 17 and 24, but we have now arranged to supply full-size blueprints of these two conversions. The price is 1s. each, post paid; ask for No. AW423 if you want the Cossor conversion and for No. AW424 if you want the Mullard conversion.

Readers who want wiring plans of the original (unconverted) Cossor Melody Maker can obtain them for 3d., post paid, on application to A.C. Cossor, Ltd.

Medium-wave Broadcasting Stations

This week we give details of all the important European medium-wave stations. Next week we shall publish a list of short- and long-wave transmitters.

Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)
201.1	1,492	Bordeaux-Sud-Ouest	France	3
203.5	1,474	Flymouth	Great Britain	3
203.5	1,474	Bournemouth	Great Britain	1
206	1,456	Fecamp	France	20.0
209.5	1,432	Beziers	France	1.5
209.9	1,429	Newcastle	Great Britain	1
215	1,395.4	Radio Lyon	France	7
218.2	1,375	Basle, Berne	Switzerland	5
221.1	1,357	Turin (2)	Italy	2
221.3	1,355.1	Vitus, Paris	France	1
222	1,351	Dublin (2)	Irish Free State	1.2
222.6	1,348	Koenigsberg	Germany	5
222.6	1,348	Milan Vigentino (2)	Italy	7
224	1,339	Montpellier	France	8
224	1,359	Lodz	Poland	2.0
225.6	1,330	Hanover	Germany	1.5
225.6	1,330	Bremen	Germany	1.5
225.6	1,330	Flensburg	Germany	5
225.6	1,330	Stettin	Germany	5
225.6	1,330	Magdeburg	Germany	5
227.1	1,321	Megyarovar	Hungary	1.25
230.2	1,303	Danzig	Germany	9
231.8	1,294	Linz	Austria	5
231.8	1,294	Salzburg	Austria	5
231.8	1,294	Klagenfurt	Austria	2
233.5	1,285	Aberdeen	Great Britain	1
236.8	1,267	Nurnberg	Germany	2
237.7	1,262	San Sebastian (EAJ8)	Spain	6.6
241.9	1,240	Cork	Irish Free State	1
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 Stranice (2)	Czechoslovakia	3
251	1,195	Frankfurt-am-Main	Germany	17
251	1,195	Trier	Germany	2
251	1,195	Freiburg im Breisgau	Germany	5
251	1,195	Cassel	Germany	2.5
251	1,195	Kaiserlautern	Germany	1.5
253.2	1,185	Kharkov (2)	U.S.S.R.	35
255.1	1,176	Copenhagen	Denmark	10.0
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
267.5	1,121.7	Nyiregyhaza	Hungary	6.25
269.5	1,113	Kosice	Czechoslovakia	2.5
271.7	1,104	Naples	Italy	1.5
271.7	1,104	Madona	Latvia	15.0
274	1,095	Madrid EAJ7	Spain	3.0
276.2	1,086	Zagreb	Yugoslavia	7.5
277.1	1,082.6	Magyarovar	Hungary	1.25
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
291	1,031	Parade	Portugal	5.0
295	1,017	Barcelona (EAJ15)	Spain	2.0
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	1.7
307.1	977	West Regional	Great Britain	50
309.9	968	Odessa	U.S.S.R.	10
309.9	968	Grenoble PTT	France	3.0
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
325.4	922	Brussels (2)	Belgium	15
325.4	922	Brno	Czechoslovakia	35
331.9	904	Hamburg	Germany	100
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	15
352.9	850	Bergen	Norway	1
352.9	850	Valencia	Spain	3.0
356.7	841	Berlin	Germany	100
360.6	832	Moscow (4)	U.S.S.R.	100
360.6	832	Radio LL, Paris	France	1.2
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
377.4	795	Lwow	Poland	21.5
377.4	795	Barcelona (EAJ1)	Spain	8
382.2	785	Leipzig	Germany	120
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
410.4	731	Dorpat	Estonia	0.5
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

Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)
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 (ests)	Portugal	20
483.9	620	Brussels (1)	Belgium	15
491.8	610	Florence	Italy	20
499.2	601	Rabat	Morocco	6
499.2	601	Sundsvall	Sweden	10
499.2	601	Vienna	Austria	100
514.4	583.2	Riga	Latvia	15
522.9	574	Muhlacker	Germany	100
531	565	Athlone	Irish Free State	60

Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)
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	Boden	Sweden	0.6
748	401	Geneva	Switzerland	1.5
748	401	Moscow	U.S.S.R.	20.0
765	392	Ostersund	Sweden	0.6
840	357	Budapest (II)	Hungary	3.0

NOTE:—The following wavelengths are common to several transmitters: 206 m. (1,456 kcs.); 207.3 m. (1,447 kcs.); 208.6 m. (1,438 kcs.); 211.3 m. (1,420 kcs.); 214 m. (1,402 kcs.); 218.2 m. (1,375 kcs.); 221.1 m. (1,357 kcs.); 225.6 m. (1,330 kcs.); 228.7 m. (1,312 kcs.); 235.1 m. (1,276 kcs.); 236.8 m. (1,267 kcs.); 251 m. (1,195 kcs.).

Follow "The Experimenters"! OHMIC KITS of HOME-BUILT PARTS for the LUCERNE S.G. Three

See pages 239-242 of this issue for details of "The Experimenters" new receiver. Then send to OHMIC for your kit of home-built parts, which will be delivered immediately on receipt of order. Satisfaction guaranteed.

H.F. CHOKES

Build your own H.F. Chokes! A complete kit of parts, to specification, for making your own H.F. Choke, including machined former, enamelled wire, terminals, etc., together with full instructions, Ready wound, assembled, and laboratory tested slightly extra to above. Postage 3d. extra.



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LUCERNE COILS

Lucerne Coils, exactly to specifications, in kit form, include everything you need for the winding of the coils, as well as all the terminals and spacing pieces, together with full instructions. The price for each complete Coil, either for aerial tuning or inter-valve coupling, Ready wound, assembled, and laboratory tested, Postage 6d. each.



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consisting of 2 Coils, 2 H.F. Chokes, 1 L.F. Transformer Postage 6d. extra

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ATLAS ELIMINATOR, No. CA25	59/6	5/- 11 of 5/6
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Listeners' Letters

PRaising THE SIGNPOST FOUR

To the Editor, AMATEUR WIRELESS.

SIR,—Some time ago you published a set called the Signpost Four. I have been expecting to see a lot more about this set in "A.W.," as it is the finest battery set I have heard so far, and I have built dozens of sets. This is the first one I have been satisfied with.

I built it on an aluminium chassis, taking all wires and resistances underneath chassis, and it looks and is really a smart job. I thought I must write and congratulate you on this set.

S. H. CARESS.

St. Albans.

[1040]

MELODY RANGER RESULTS

SIR,—A year ago I had the satisfaction and pleasure of winning a kit set given by your paper in a picture competition. Old readers will remember that it was the AMATEUR WIRELESS Melody Ranger. I have had this set working about six months and wish you to publish my test report on it.

First, station-getting qualities. Long waves, fifteen stations; medium waves, fifty-five European and eleven American stations; short waves, 27 to 80 metre band, eleven stations; 12 to 30 metre band, two stations. A grand total of ninety-four stations.

The aerial is badly screened all round by high walls and therefore is not too efficient. The earth tube is inside the house and close to the set. Its high-tension consumption is 8 to 10 milliampères. In conclusion, I would like to thank you for a very fine set.

WM. ALLCROFT.

Workshop, Notts.

[1041]

AMERICAN RECEPTION

SIR,—Your correspondent, L. George Pouy-
anne, states "I was astonished when, without undue trouble I picked up both WBZ and KDKA and later Pittsburgh—and background noises resembled chipped potatoes frying."

Well, Mr. Editor, if he was astonished at his outfit doing this, he will be further astonished to learn that we, with an old straight three, working on a 70-ft. aerial, and 70 volts high tension can, and do, get KDKA, WBZ and WBZA regularly every night, that is, from midnight to 2 a.m.

On good nights, our total has been, so far, seven American stations at fair volume on moving-coil loud-speaker. No chips frying and no trouble.

(MR.) A. J. JEFFRIES.
(MRS.) A. M. JEFFRIES.
(MR.) A. G. JEFFRIES.

Bristol.

[1042]

Cimla, Neath.

HOME-MADE PARTS

To the Experimenters.

I feel I must write to you and thank you for your recent articles describing how to make up one's own components. I have just made up the intervalve transformer, and the results are remarkable.

I am not quite sure which pleases me more, the excellent results or the knowledge that I made the component myself. I rather fancy the latter.

Please let us have some more of these interesting articles.
London, S.W.9. W. Andrews.

CHEAP HIGH-TENSION BATTERIES

SIR,—Mr. Smith's letter on this subject is interesting, but he rather evades the point at issue.

Firstly, I would state that my "down" on good-quality (?) dry batteries is a result of the very disappointing results they have given me. Whether the cheap battery can equal these performances, or perhaps better them, I have yet to prove.

I am quite aware of the elementary facts regarding consumption which Mr. Smith refers to, but I am afraid that I must differ when he states that the average detector and two low-frequency sets take from 9 to 12 milliampères. There are now on the market, as he must be aware, valves which have a very much lower consumption, for instance, the LP2 output valve which, according to the maker's curves has an anode consumption of 2½ milliampères at 100 volts with 4½ volts grid bias, and gives reasonable quality when operating a balanced-armature loud-speaker.

This valve is the output valve in my present set which does not, with the recommended grid bias on all valves, take at 100 and 75 volts high tension more than 4½ milliampères. This, however, is all by the way and irrelevant, as are Mr. Smith's remarks regarding the quality of reproduction.

The point in question is that the much-advertised standard good-quality batteries do not give the results claimed even when the current drawn is of the order of 5 to 7 milliampères, and this I have proved.

I have no brief for the "five-bob" battery which, however, I have now had on test for four weeks and which is still "going strong." Further, I am assured by a number of dealers that some, at least, of these batteries are made by reputable firms who also make standard-quality batteries so that the question of decently-paid labour may not arise.

Although I am still Disillusioned,

I am, Sir,

H. J. DUPONT.

[1043]

OSTAR-GANZ

UNIVERSAL MODEL SETS

"UNIVERSAL" HIGH VOLTAGE MAINS VALVES as used in the "UNIVERSAL" 5-VALVE SUPER reported upon in this issue (see page 251), enable anyone to build a splendid "Universal" A.C. or D.C. set. Highly efficient and most economical in every way. NO TRANSFORMERS, NO RESISTANCES, NO BARRETTERS needed.

ASTOUNDING results guaranteed by our technical staff. MANUFACTURERS and HOME CONSTRUCTORS should write for full details of the complete range of Ostar-Ganz High Voltage Mains Valves that reduce the cost of "Universal" A.C. or D.C. mains receivers to that of battery sets. Remember, too, that Ostar-Ganz Valves work equally as well on either D.C. or A.C., so there's never any need to scrap them because your electric supply is changed.

Sole Distributor for Gt. Britain
EUGEN J. FORBAT, 28-29 Southampton Street, Strand, London, W.C.2.

Strict Agents Wanted.
Phone: Temple Bar 8608.

Don't fail to read the "Test" report on the "OSTAR-GANZ 5-VALVE SUPER" (see page 251). These "Universal" sets are the most economical to buy and use. They work off either A.C. or D.C. supply without alteration. Remarkably free from mains hum. Highly selective. Reproduction is superb.

5-VALVE SUPER MODEL, 200-2,000 metres. Complete and ready for immediate use	£15 15 0
Model covering 12-2,000 metres	£18 18 0
"UNIVERSAL" 5-VALVE SUPER RADIOGRAM	£23 2 0

The same models also supplied in KIT form, with full-sized blueprint, all instructions, and technical help given if desired. 5-Valve Super Receiver (with valves), 11 gns. 5-Valve Radiogram (with valves, Garrard Universal motor), 15 gns. You should know all about the "UNIVERSAL" 7-VALVE STENODE SUPER, our excellent all-mains, all-waves, all-electric receiver. Full particulars of this and our full range of Receivers and Radiograms sent on request.

Sets of the Season Tested

Ostar-Ganz Universal Super-het

HUM is a factor that, unless defined very carefully, is inclined to be a very controversial point. What one listener may call a negligible background is to another a constant source of irritation, so that when giving any details of the amount of hum present in a mains receiver we have to think of both of these listeners before giving our verdict.

It is not very often that this point is overcome for us. In the Ostar-Ganz all-mains there is not the slightest trace of hum whatsoever. It is impossible to detect whether the receiver is working or not unless a station is actually tuned-in. This applies when working on either A.C. or D.C. mains.

Outstanding Cabinet Design

The first outstanding point is the unique cabinet design which, although only slightly different from the usual trend of cabinet work, has little ideas embodied in the construction to make it very pleasing to the eye. It is neither large nor small, a nice intermediate size having been chosen. Actually the dimensions are 15 in. wide, 21 in. high and 12 in. deep.

Although there are five valves, the receiver and moving-coil loud-speaker are all enclosed in this cabinet without the slightest trace of overcrowding. The first valve is an S25, a fixed grid-base screen-grid used as a combined oscillator/detector. This is followed by a variable-mu screen-grid intermediate amplifier, screen-grid detector, multi-grid output valve and valve rectifier.

Provision has been made for a gramophone pick-up, but not for additional loud-speakers. This is one of the first sets that we have tried—or rather one of the most ambitious sets—using the new Ostar-Ganz high-potential heater valve. With this type of set the receiver can be used almost anywhere where there is mains supply, whether they are D.C. or A.C.

Exceptional Quality

On test a most interesting point is the exceptionally good quality. The moving-coil loud-speaker is of exceptionally large dimensions, manufactured by Magnavox, and handles the output of 2½ watts from the PT3 with the greatest ease.

The tuning dial is calibrated in wavelengths and degrees, and tunes between 200 and 550 metres and 700 and 1950 metres.



The new Ostar-Ganz Universal five-valve superhet is housed in a particularly attractive cabinet, as this photograph shows

BRIEF SPECIFICATION

Makers : Ostar-Ganz.
 Model : Universal five-valve super-heterodyne.
 Price : £15 15s. or, as a kit, £11 11s.
 Valve Specification : Screen-grid combined oscillator-detector (S25), variable-mu screen-grid intermediate-frequency amplifier (MS18), screen-grid detector (S100), R.C. coupled to a multi-grid output valve (PT3). Valve rectifier.
 Power Supply : 110-250 volts, A.C. or D.C.
 Type : Upright self-contained table model.
 Remarks : One of the few universal mains superheterodynes that solves the problem for the user on D.C. mains who may be changed over to A.C. mains in the future.

There are three control knobs and a master switch. On the left-hand side is the volume control. On the right-hand side the wave-change and radio-gramophone switch, while in the centre is the tuner. The toggle switch in the centre of the front cuts off the mains supply.

Easily-replaced Fuses

An interesting point are the fuses. Instead of using the tubular type, which are not always easy to obtain, simple flash-lamp bulbs with screw taps are employed, which means that should the fuses fail they can be replaced without any difficulty.

The selectivity is of the order of 9 kilocycles on medium waves and 8 kilocycles on long waves, so that the majority of the stations under the Lucerne Plan can be separated easily.

During our tests, stretching over quite a long period, we tuned-in all the worth-while Continental stations, sixty being of entertainment value. In the early hours of the morning, eight American stations were picked up.

One is perhaps prepared to expect a lower degree of sensitivity with a receiver that is so universal and adaptable, but with the Ostar-Ganz Super the results are up to the highest standard and quite equal to sets using more conventional type of A.C. valves. It is exceptionally good value for money.

Notes and Jottings

IDENTIFICATION cards are to be supplied to H.M.V. service engineers. The "passport" will be about the size of a driving licence and will contain a photograph of the engineer. It is hoped that this idea will remove difficulties that have arisen in the past when the maid, being the only person in the house, has refused to admit the engineer because of doubt as to his identity.

A meeting will be held on March 1 of the Golders Green and Hendon Radio Society at the Hampstead Public Library, when they will deal with possibilities of amateur cinematographs and sound reproduction. A demonstration of the new piezo-electric loud-speaker will also be included.

It is interesting to know that modern radio apparatus reaches such out-of-the-way places as Tonga Islands. The apparatus in question is an R. & A. moving-coil loud-speaker, and is owned by D. Riechmann, of Lifuka-Haapai.

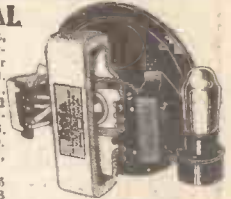
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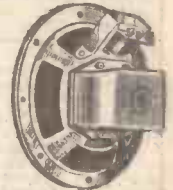


ROLA P.M. 6 P.M. Class B Speaker. Send only 5/-. Balance in 8 monthly payments of 4/3. Cash or C.O.D., Carriage Paid, £1/19/6.

N.I.S. CLASS 'B' SPEAKER

SENT ON 7 DAYS' TRIAL

Complete with Input Transformer. Power or Pentode. Send only 2/6 for 7 days' trial. If approved, balance in 5 monthly payments of 4/6. Cash or C.O.D. Carriage Paid, £1/9/6. LAMB B Model, same price and terms. When ordering, state which type required.



CELESTION P.P.M. 19 MOVING-COIL SPEAKER

SEND FOR IT ON 7 DAYS' TRIAL

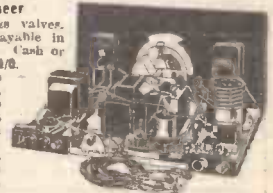
With Standard or Pentode Transformer. Send only 5/- for 7 days' trial. If approved, balance in 11 monthly payments of 4/6. Cash or C.O.D. Carriage Paid, 4/6.



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Described in the Telsen Model Radio Engineer Complete Kit of Parts, less valves. Send only 5/-.. Balance payable in 11 monthly payments of 7/-. Cash or C.O.D. Carriage Paid, £3/14/6.

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WANTED.—Mains and Battery Valves; also clean surplus Components.—Newport Surplus Stores, 24a Newport Court, Charing Cross Road, W.C.2.

LUCERNE RANGER, COMPLETE SPECIFIED KIT, 30/-. Ether Searcher Kit, £3/3-. Century Super, £5. S.T.500, 78/-. Wren Easton C.L.B., £5/10/-. with valves, batteries, and speaker.—"Melfo-Rad," Specified Kit Specialists (Dept. A.W.), 5 Queen's Place, Hove. Lists Free. (Trade supplied.)

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INFORMATION BUREAU

Will every querist please observe the following revised rules?

Please write concisely, giving essential particulars. A fee of one shilling, postal order (not stamps), a stamped, addressed envelope and the coupon on this page must accompany all queries.

Not more than two questions should be sent at any time.

The designing of apparatus or receivers cannot be undertaken.

Slight modifications of a straightforward nature only can be made to blueprints. For more serious alterations the minimum charge is 2/6.

Blueprints supplied by us will be charged for in addition, but of course, readers may send their own blueprints for alteration.

Modifications to proprietary receivers and designs published by contemporary journals cannot be undertaken. Readers sets and components cannot be tested by us. Queries cannot be answered by telephone or personally. Readers ordering blueprints and requiring technical information in addition should address a separate letter to the Information Bureau and should see that their remittance covers the price of the Blueprint and the amount of the query fee.

We do not answer queries in cases where the fee is omitted.

Queries should be addressed to the "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.

ACCUMULATOR CHARGERS.—1 amp., 2.6 v. In ventilated case with mains flex (Westinghouse rectifiers. 13/11. Lamp, 16/11. Postage, 6d. and 9d. 7 days' trial. Lists free.—W. Arden Agency, Wollastop, Wellingborough.

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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 catalogue 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.

Marconi Radio

The latest catalogue of Marconi receivers includes the Lucerne Special model 286, which is available for A.C. or D.C. mains. The model 248 is a popular two-valve battery-operated receiver with built-in loud-speaker at the very low price of £4 4s., complete with batteries. There is a wide range of A.C. and D.C. receivers, table models and radiograms, from which to choose. Extension loudspeakers and the model 19 pick-up are also listed. **145**

Solon Electric Iron

Every keen constructor should possess an electric soldering iron—that is, of course, if he has electric mains available. Soldering with an electric iron is so much easier than with an externally heated type. One of the best I have tried is the Solon, costing only 7s. 6d. Four minutes after switching on it is ready for use and it only consumes about 60 watts—that is, about the same as a normal light. This means that you get fifteen hours of use for the price of one unit. **146**

FULL-SIZE BLUEPRINTS

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1931 Crystal Set AW308

ONE-VALVE SETS (1s. each)

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Consecutive Two (D. Pen) AW403
Big Power Melody Two, with Lucerne Coils (SG Trans) AW338A
B.B.C. National Two, with Lucerne Coils (D. Trans) AW377A
Screen-grid Two (SG Det. Trans) WM289
A Two for 7 Metres (D. Trans) WM295
New-style Radiogram (D. Trans) WM299

THREE-VALVE SETS (1s. each)

A.C. Quality Gem (D. Trans) WM312
Everybody's Home Radiogram (SG, D, Trans) AW381
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Class-B Three (D, Trans, Class B) AW386
S.S.3 (A.C.) (SG, SG Det, Pen) AW390
"Up-to-the-minute Three" with Class B, 1/6 AW384B
A.C. Triodyne (SG, D, Pen) AW399
Home-built Coil Three (SG, D, Trans) AW404
Fan and Family Three (D, 2LF) AW410
5 5s. S.G.3 (SG, D, Trans) AW412
A.C.-D.C. Universal Three (SG, Det, Pen) AW414
1934 Ether Searcher (SG, Det, Pen) Baseboard AW417
1934 Ether Searcher (SG, Det, Pen) Chassis AW419
Duo-tune Three (SG, D, Pen) WM341
A.C. Transportable (SG, D, Pen) 1/6 WM341
All-wave Three (D, 2 LF) WM348
Economy S.G.3, with Lucerne Coils (SG, Det. Trans) WM263A

FOUR-VALVE SETS (1s. 6d. each)

Melody Ranger (SG, D, RC, Trans) with copy of "A.W." 4d. postage AW375
"A.C. Melody Ranger" (SG, D, RC, Trans) AW380
Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of most of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine." Address letters:

Amateur Wireless Blueprints Dept., 58-61 Fetter Lane London, E.C.4

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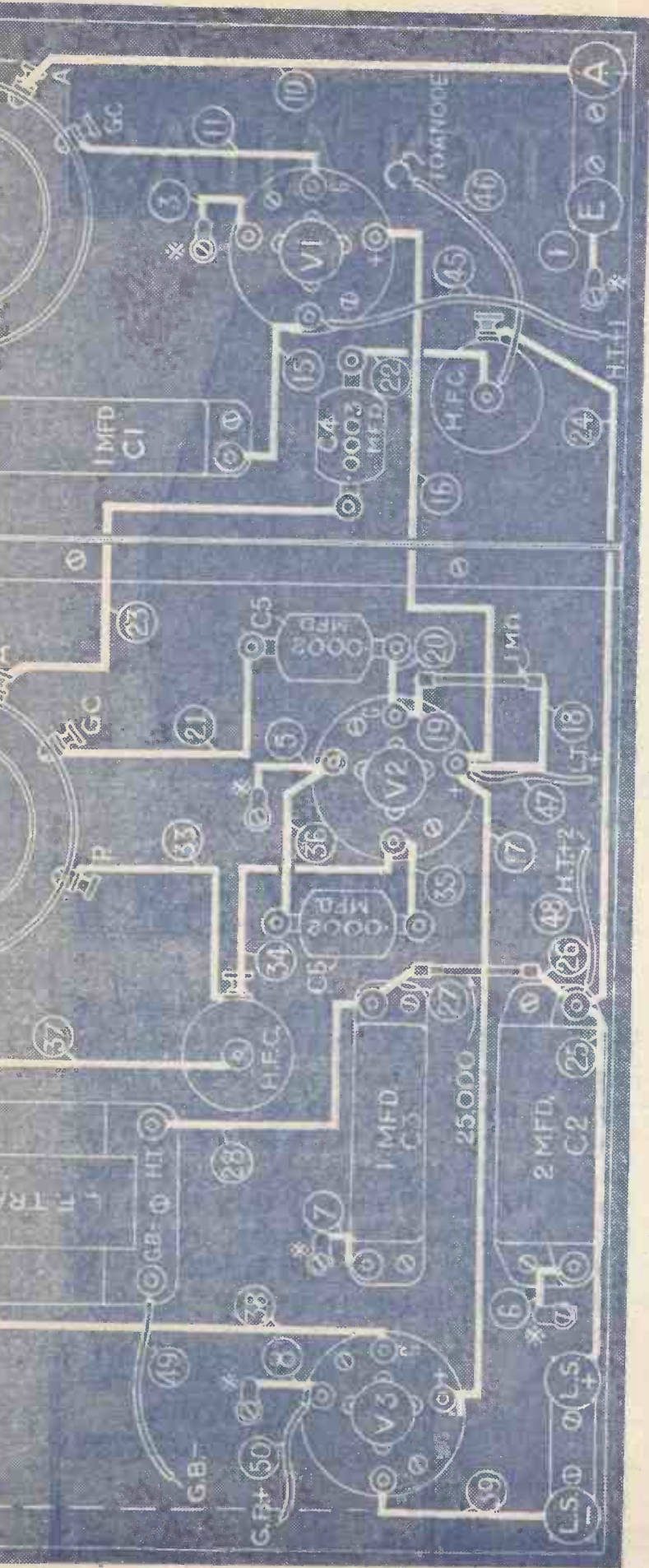
M.P.R. Ltd ROMFORD, ESSEX.



Amateur Wireless
FEE 1/-

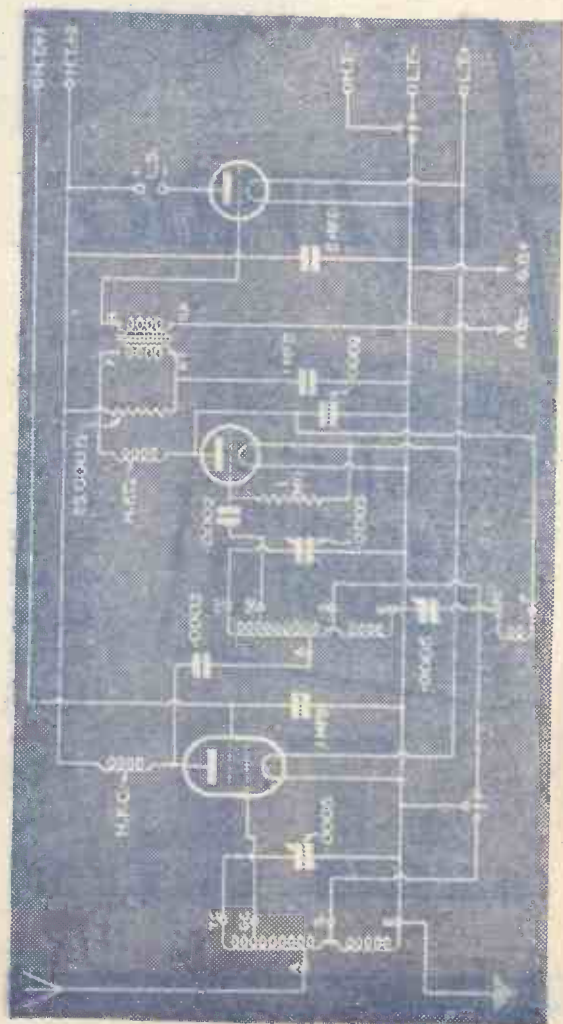
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Available until Saturday,
MARCH 10, 1934

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FULL CONSTRUCTIONAL DETAILS
APPEAR ON PAGES 239-242

YOU CANNOT GO WRONG IN BUILDING
THE SET IF YOU USE THIS BLUEPRINT
AND THE SPECIAL PHOTOPLAN AND
POINT-TO-POINT WIRING GUIDE TO BE
FOUND ON PAGE 241 OF THIS ISSUE



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for EVERY BATTERY SET

There is an "ATLAS" Unit to convert any Battery Receiver to Mains Operation in a few minutes without alteration to set or valves; giving more power, improved tone, sharper selectivity at one fiftieth of the cost of dry batteries.

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••• BECAUSE no other units have such a reserve of power. Voltages are higher, outputs greater, smoothing finer. There is an ideal "ATLAS" A.C. or D.C. model for every type of set—table, console or portable—home constructed or commercial—even "Class B" and "Q.P.P." and 25 cycle models without extra charge. Every designer of note specifies "ATLAS," the only units to win the Olympia Ballot for two years in succession. Scrap your expensive batteries and cut running costs to LESS THAN 1/- a YEAR by following the experts—insist on "ATLAS."

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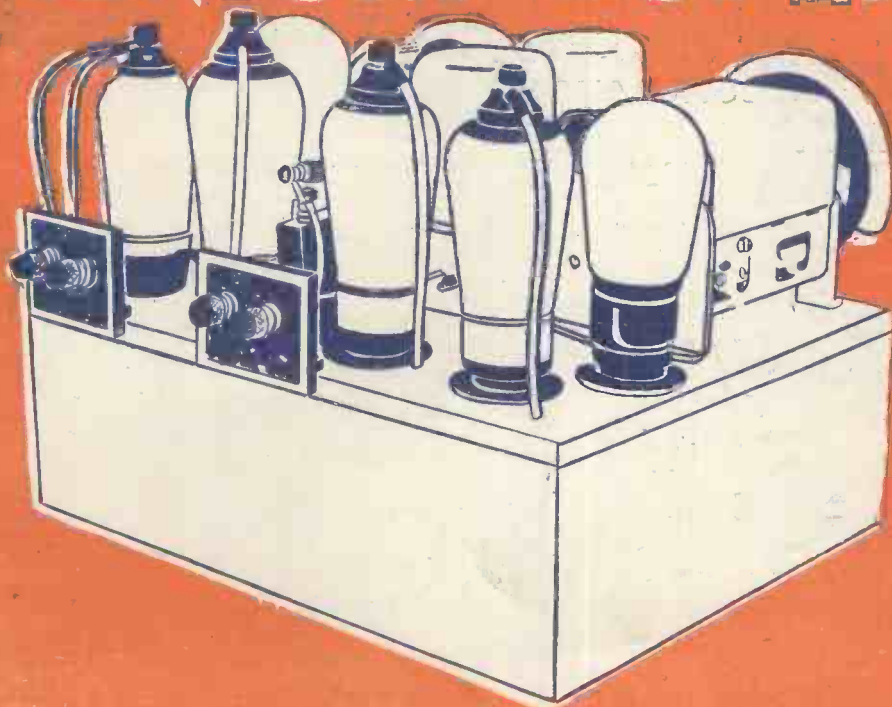
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Circuits Give
Amazing Selectivity*

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*Terminals for
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RECEIVERS

RECEIVERS

Model 8060. 6-valve All-mains A.C. Super-het Receiver £12/12/-
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 Model 8051 (A.C.) and Model 8052 (D.C.). 3-valve All-mains Pedestal Receivers £12/12/-
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 Model 8033. 3-valve Battery Receiver, Moving-coil Loudspeaker £8/7/6
 Model 8019. 3-valve Battery Receiver, Balanced-armature Loudspeaker £7/15/-
 Model 8012 (D.C.) and Model 8014 (A.C.). 2-valve All-mains Receivers £6/19/6
 Model 8030. 3-valve Popular Battery Receiver £4/17/6
 Model 8020. 2-valve Pentode Battery Set, Walnut Case £4/4/-
 Model 8005. 2-valve Pentode Battery Set Oak Case £3/19/6
 All Lissen Receivers are supplied complete with Valves, Batteries, etc., and are ready to operate immediately.



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Model 8048. Kit, complete with seven valves. £8/17/6
 Model 8049. Kit, complete with seven valves and table model cabinet £9/15/-
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3-Valve All-Mains A.C. Receiver

Model 8031. Kit, complete with valves. £7/10/6
 Model 8037. Kit, complete with valves and table model cabinet. £8/15/-
 Model 8038. Kit, complete with valves, Console Cabinet and Moving-coil Loud-speaker £10/12/6

4-Valve All-Wave All-World Range Battery Receiver

Model 8045. Kit, complete with four valves. £6/12/6
 Model 8046. Kit, complete with four valves and table model cabinet £8/9/-
 Model 8047. Kit, complete with four valves, Console Cabinet and Permanent Magnet Moving-coil Loud-speaker £8/2/6

The Famous Original 3-Valve Battery Receiver

Model 8013. Kit, complete with three valves. £4/9/6
 Model 8021. Kit, complete with three valves and table model cabinet. £5/5/-
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ACCUMULATORS

H.T. BATTERIES

STANDARD TYPE		SUPER POWER TYPE		All types of Torch and Pocket Lamp Batteries
60-volt	5/8	60-volt	8/6	
100-volt	9/3	100-volt	15/-	
120-volt	11/-	GRID-BIAS TYPE		
144-volt	13/8	45-volt	10/8	
(for Q.P.P.)		9-volt	1/-	
		10-volt	1/3	

ACCUMULATORS

Complete with charge indicators and carrier handles:

POPULAR GLASS CONTAINER TYPE	
2-volt 50	4/6
3-volt 45	5/6
3-volt 70	10/3

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VALVES

There is a Lissen Component for Every Purpose in Every Receiver circuit. Condensers, Coils, Chokes, Resistances, Grid Leaks, Transformers. No matter the degree of your interest in Radio, Lissen literature will show you how to improve your reception.

There is a Lissen Valve for every radio receiver, Some popular battery types—
 S425 for distant reception £12/6
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 P220, for power output £7/8
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News and Gossip of the Week

Easter Plans

YOU will be able to make whoopee with the radio on Easter Monday, when the B.B.C. is giving us dance music from 9.15 until midnight.

Before that we shall have been amused (we hope) by an hour's top-line variety, followed by a quarter of an hour of Gillie ("Hogsnotton") Potter.

U.S.A. Takes Us

THEY are making more and more use of the Empire-station link, those American broadcasters. Columbia system will take the Boat Race running commentary via Daventry short-waver.

Later both Columbia and N.B.C. propose to tap this profitable source of British broadcasting for the commentary on the Grand National.

Luxembourg Beckons

YES, beckons our radio stars to the little Duchy, with promise of fabulous fees to broadcast from the pirate Radio Luxembourg station.

The B.B.C. has not declared itself, but artists are tacitly aware that if they take up Luxembourg contracts their B.B.C. fees will shrink immediately.

Bow Bells Calling

LIKE you the sound of Bow bells for the interval signal? Some do, others don't. Opinion seems to be that the sound is a trifle melancholy. But it can't be worse than the death-watch beetle noise.

Our respected Chairman of the Board of Governors thought of the bells idea, and, if Sir John Reith gives it his assent, it will permanently replace the "d.w.b."

Exciting Breakdown

LONDON-STATION engineers are recovering from a gruelling time with a most unusual breakdown. A valve in a C unit blew itself to pieces, and later the distracted engineers had to cope with a grid-leak voltmeter catching fire.

Listeners lost the National station for only a little over three minutes. Pretty slick work, chaps!

Vulnerable Stations

ALMOST at the same time North Regional had one of its worst breakdowns, being off the air one night recently for over half an hour when a condenser shorted.

Scottish Regional had a spot of bother with a flashover in the feeder hut. Altogether an exciting week for the engineers.

Pastures New

OUR engineers have a great name overseas. Often they are snapped up for work on foreign or Empire work.

Victor Bulow, superintendent engineer, has just left to look after the technical side of broadcasting in the State of Madras. Good luck!

Towards Seven Millions

INDEED to goodness, yes, the Post Office detection van is in Welsh Wales, looking for trouble.

Pirates—or, as the Americans would call them, radio bootleggers—had better beware in the districts of Cardiff, Newport and Swansea.

New-style Alibi

WHAT did you think of the play, *Alibi from the Air*? The idea of voices from the past being picked up through the ether revived in dramatic form, eh?

Clever recordings of a promising newcomer, Lawrence Shiel, who took the part of the murderer, made admirable hearing.

Whitley—S.W. Fan!

TO South America J. H. Whitley, Chairman of the B.B.C. Governors, takes with him

a short-wave set specially constructed by the Clapham Research branch of the B.B.C. engineering department.

Mr. Whitley will hear for himself how the Empire signals are getting through 6,000 miles away. He is tremendously keen on this Empire broadcasting business.

Geneva—Latest

WHILE you may hear more definite news when this appears, at the moment of closing the paper for press we have nothing to report from the Geneva confab.

Our men are sticking out for the retention of 1,500-metres channel for Daventry but they may have to give way a little. A message has been sent to Russia asking why they have not yet turned up.

Perhaps the answer is that Russia has other ideas as to what is going to happen on the long waves. Menacing prospect!

That B.B.C. Film

JOHN GRIERSON is making headway with his film of the B.B.C. Already some of the outdoor "shots" of Broadcasting House and transmitting station have been taken.

During the Boat Race, Grierson will be in the launch following the two boats—in order to film this most exciting of outside broadcasts for the coming epic of B.B.C. work.

At No. 16

WE have now been inside the new television studio. It is all rather a lash-up at the moment, but the 30-line apparatus is in full swing.

Eustace Robb, Television Director, seems pleased with the new conditions, promising that we shall get faster-moving shows from now on.

NEXT WEEK

It is with pleasure that we are able to announce that next week Noel Bonavia-Hunt, M.A., the well-known authority on musical reproduction, will begin a special series of articles on quality.

He will deal with this increasingly important angle of radio from every point of view and in particular will base all his recommendations on the fact that most amateurs want to use only low anode voltages.

Voice of the West

HOW will the B.B.C. answer Mr. Bigg-Wither, of Teignmouth? He points out, in a letter to the "D.G." himself, that the West country has more than double the licences of Wales—yet West Regional gives a great deal of Welsh material.

Further, that if North Scotland, with its mere 11,000 licences, can agitate and obtain a regional of its own, the counties of Devon and Cornwall, with respectively 102,000 and 30,000, have surely an even greater claim to special attention.

Crooners Winning?

IF one may judge from the B.B.C.'s letters, listeners are voting against the "straight" type of singer in dance-band broadcasting—and agitating for the retention of the crooners.

Opinion is everywhere in favour of a rhythmic type of singing for dance-band accompanists, so perhaps the crooners will win the day in spite of all the press agitation against them.

A.C. Century Super

EVERY mains user ought to be happy this week, for on pages 264 and 265 we give details of that super-het *par excellence*, the Century Super, designed for A.C. operation on the lines of the recent "Experimenters'" battery-operated model.

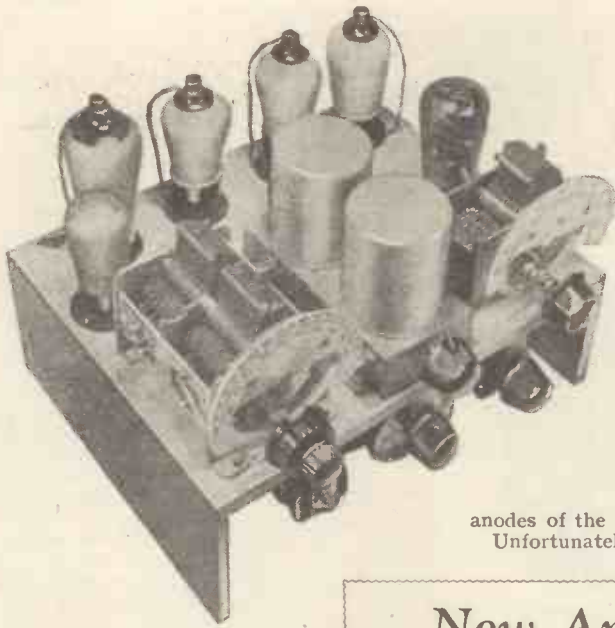


L.N.A. photo

Mr. J. H. Whitley, former Speaker of the House of Commons and Chairman of the B.B.C., has taken a B.B.C.-designed set with him to South America. Our photograph shows Mr. and Mrs. Whitley in their cabin on the "Arlanza" with the set installed for reception.

A Local-distance Switch for the 1934 Century Super

By the "A.W." Technical Staff



IN response to requests from numerous readers we have recently been experimenting with a view to adapting the 1934 Century Super for local-distance reception.

Most readers from whom we have received letters embracing the above suggestion have asked whether it would not be possible to introduce some simple form of switching to cut out either the first or second detector and the two intermediate-frequency valves. In a normal type of super-het receiver, this would have been both possible and very desirable.

Unfortunately, however, this was not practicable, but we have succeeded in reaching a suitable compromise in that the arrangement we have adopted most certainly effects a considerable saving in anode current. Furthermore, when receiving any local or powerful stations, the characteristics of the valves preceding the second detector are so altered as to obviate any tendency to overloading and distortion.

Simple Principle

The principle of the arrangement covering our simple modification is quite easy to explain. We have merely introduced a two-pole double-throw switch into the biasing circuit of the intermediate-frequency valves to bring into, or cut out of circuit, additional bias.

By over-biasing the intermediate valves, their individual amplifying properties are reduced to an almost negligible degree: additionally, their individual anode current and screen-grid current consumption is materially reduced.

As regards the amount of additional biasing voltage required, this depends entirely upon how near to the local station the set is to be used. It is safe to say that not more than 4.5 volts will be required. Usually, not more than 1.5 volts extra bias will be needed, but there may be occasions when 3 volts bias will

be an advantage in cutting down the excess volume.

When discussing certain tests which were to be conducted with the receiver, prior to first reception experiments, our contributors, "The Experimenters," suggested that certain voltage readings should obtain at the anodes of the various valves.

Unfortunately, they overlooked the possi-

bility of many amateurs using low-resistance voltmeters for this particular test and a number of constructors have written saying that their voltage readings do not coincide with the figures given in AMATEUR WIRELESS.

Unless an extremely high-resistance voltmeter is used, this result is to be expected. To obviate further doubts in this respect we give below a list of the different anode-current and screen-grid current readings that should obtain:

- .2 of a milliampere for the anode of the first detector; 1.5 milliamperes for the anode of each screen-grid intermediate valve; .5 milliamperes for the screen of each screen-grid intermediate valve; 4 milliamperes for the anode of the oscillator valve; 3 milliamperes for the anode of the L2/DD valve; 8 milliamperes for the anode of the pentode valve; and 3 to 4 milliamperes for the auxiliary grid of the pentode valve.

Normal Readings

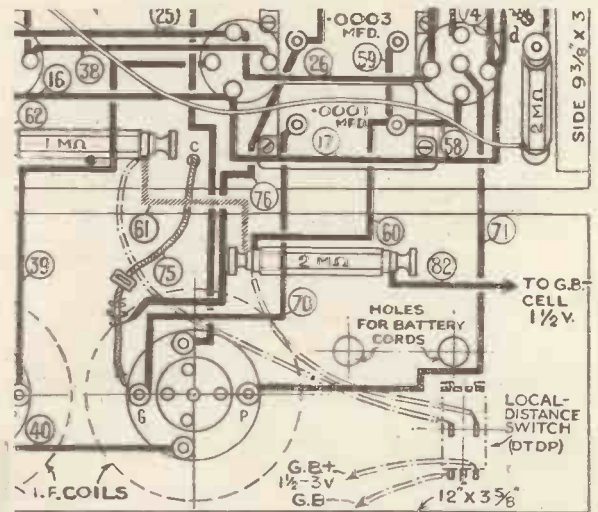
These readings should be obtained with a milliammeter, of course, and are correct for the normal working of the set

Now An A.C. Version!

In response to numerous requests the "Amateur Wireless" Technical Staff has taken "The Experimenters'" original battery-operated 1934 Century Super (described in our issues of December 9 and 16) and converted it for A.C. mains operation.

Full details are given on pages 264—265 and here are some of the outstanding features of the design:—

- The layout and components are substantially the same as in the battery model.
- The mains unit is built up separately and uses a valve rectifier.
- Self-adjusting volume control by means of a double-diode-triode.
- Separate tuning for band-pass and oscillator—no ganging troubles.
- Greater efficiency from A.C. indirectly-heated valves.
- Output of 1.25 watts—enough to drive a big moving-coil loudspeaker.
- Compact design that will fit into a table console cabinet if desired.
- Pick-up terminals are provided so that the set can be used as the basis of a high-power radio gramophone.
- Most of the parts used in the original A.C. Century Super can be employed in this greatly improved 1934 design.



Wiring guide for adding a local-distance switch to the 1934 Century Super



How the local-distance switch is fitted to the side of the chassis

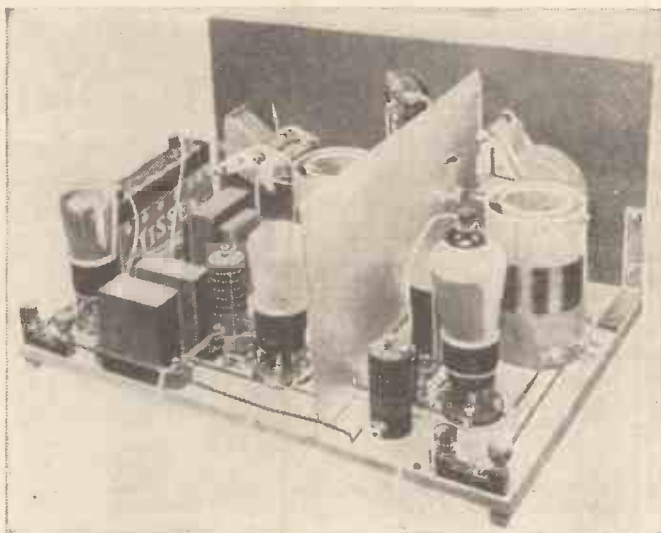
without the additional bias for local-station reception.

Some readers seem to have got into difficulty with regard to the metal-braided flexible wires which project up through the baseboard of the chassis. The following advice is extended to them and to others who may fall into the same trap:

On no account should this metal braiding be allowed to come into contact with the internal wire forming the actual circuit connection, inasmuch as the braiding is earthed. Further, the braiding must not touch the copper cans of the intermediate-frequency transformers, as these cans are not actually at earth potential.

Getting Stations with the Lucerne Ranger

The Experimenters Give
Some Further Hints on the Set
They Described Last Week



Great interest is being taken in "The Experimenters'" Lucerne Ranger, the construction of which was fully described last week

BY now many of you will have put together our latest effort—the Lucerne Ranger. We want to deal in this article with many little points that have cropped up since we began this series of articles, in the hope that puzzled readers may thus erase the furrows from their troubled brows.

May we, right away, thank everyone for writing to us. Even if we have not had time to answer them all we deeply value such wholesale evidence of practical interest. As usual, some of our letters have been from anonymous amateurs—rather trying, because, of course, such letters are useless.

Tuning Too Sharp!

One miserable soul has written in to say that the tuning of the Lucerne coil is too sharp and the only evidence we had of the location was a postmark. If only that man had told us his address we could have written and shown him how to flatten out the tuning a little, making it more suitable for his district.

We have had several anonymous letters about the coils, some telling of flat tuning, others of over-sharp tuning. In all cases the troubles can be overcome by a very simple adjustment of the winding.

Last week, for example, we showed how selectivity might be varied by altering the number of turns on the aerial-coupling coil, and this point was also made clear in our first article on how to make the coils.

Get this clear. If the coils are too sharply tuned, you can flatten them. If too flat you can easily sharpen them. It all depends on the last ten turns on the outside former.

When this coil was designed it was very suitable for use about 30 miles from a regional station. With ten turns in the aerial circuit the selectivity was just about right. Now, when this coil was tested in the London area only five turns were needed to give the same amount of selectivity.

On the other hand, if the coil were used in North Wales or the East Coast, probably fifteen turns would be needed to avoid over-sharp tuning.

Don't forget that the individual adjustment of the number of turns on the small coupling winding is applied to *both* the coils in the Lucerne Ranger. Do one at a time and get each condenser tuning just as sharply as you need.

To avoid any mistake, note that the winding you experiment with is the one on each coil that ends at the point marked A.

Now for a few words on valves. Last week we gave a complete list of suitable makes and types, you remember. When we got out this list we had in mind the anode-current drain on the usual standard-capacity type of battery. We purposely chose valves that would not unduly over-run the battery.

If, though, you are using a mains unit, giving, say, 25 milliamperes, we strongly advise you to go in for a larger power valve than those listed—or even a pentode. If you do use a pentode you will need the four-pin type with side terminal or a new valve-holder with five pins instead of four.

Larger Output Valves

Suitable valves for the output stage in the larger class are the Mullard PM202 or Cossor 230XP—that is valves of the low-impedance type. If you want pentodes there are the Mazda Pen220A and the Marconi PT2 types, for example.

We had no space last week to tell you anything about the operation of this set. Actually it is a very easy set to work, and once you have had an evening with the various controls you will assuredly be able to rope in heaps of foreigners without any difficulty.

First, about those two switches. The top switch cuts off both high tension and low tension when pushed in, and the switch below is for wave-changing. When this lower knob is pushed in the whole of the windings are brought into action and the waveband from 850 to 2,100 metres is covered. When the knob is pulled out the medium waves are in use as one of the windings is then shorted. The wavelength range covered here is 180 to 650 metres.

So much for the mere subsidiary controls. You have now to consider the three variable condensers. The condenser marked VC₁ on last week's photoplan is the aerial-tuning condenser and is always flatter, remember, than VC₂, which is the grid-tuning condenser of the detector. Don't try to sharpen up the aerial to the same extent as the grid tuning, otherwise you will be sacrificing volume too much.

Relative Sharpness of Tuning

For example, if you can cut out the local station in about 2 or 3 degrees on VC₂ it should take 4 or 5 degrees on the aerial-tuning condenser VC₁.

As you probably guess, VC₃ is not for tuning, but for reaction. The maximum volume is obtained when the reaction condenser is turned in a clockwise direction. Don't go too far or you will cause the detector valve to oscillate. With the large .0005-microfarad reaction condenser and carefully designed reaction winding you should find that reaction is exceptionally smooth.

Should you be using a very high-impedance detector, in spite of our recommendation to

Continued on page 256

PARTS NEEDED FOR THE 39/- LUCERNE RANGER

SUITABLE VALVES

Make	Screen-grid	Detector	Power	Price
Cossor*	215SG	210Det	220PA	£ 11 3
Dario	TB422	PB172	TB062	1 2 0
Eta	BY6	BY1210	BX604	1 5 0
Hivac	SG210	D210	P220	1 1 6
Lissen	SG215	L2	P220	1 5 3
Marconi*	S23	L210	LP2	1 11 3
Mazda*	S215B	L2	P215	1 11 3
Micromesh*	5B1	HLB1	PB1	1 11 3
Mullard*	PM12A	PM2DX	PM2A	1 11 3
Osram*	S23	L210	LP2	1 11 3
Six Sixty*	218SG	210D	220PA	1 11 3
Triotron	S215	SD2	ZD2	1 2 0
Tungsram	S220	LD210	P215	1 5 0
362	SG2	L2	LP2	1 5 0

* Ird.icates B.V.A. valves

BASEBOARD

1—14 in. by 10 in., metallised ... s. d. 1 9

CHOKES, HIGH-FREQUENCY

2—As described in "A.W." for February 3 ... 3 0

COILS

2—Lucerne aerial and grid types, as described in "A.W." for January 27 ... 5 0

CONDENSERS, FIXED

2—.0002-microfarad ... 1 0

1—.0003-microfarad ... 6

2—1-microfarad ... 4 0

1—2-microfarad ... 2 6

CONDENSERS, VARIABLE

2—.0005-microfarad, air dielectric ... 7 0

1—.0005-microfarad, reaction type ... 2 0

HOLDERS, VALVE

3—Four-pin ... 1 1½

PLUGS, TERMINALS, ETC.

5—Wander plugs ... 5

2—Spade terminals, marked: L.T., L.T.— ... 4

2—Terminal blocks ... 1 0

RESISTANCES, FIXED

1—25,000-ohm ... 7½

1—1-megohm ... 7½

SUNDRIES

Wood for panel, 14 in. by 7 in. ...

1 ft. brass strip ...

3 vds. thin flex ... say,

10 ft. insulated wire ... 2 2½

6—Bolts and terminals ...

1—Aluminium sheet, 10 in. by 6 in. ...

2—3 in. dials ... 8

SWITCHES

2—Three-point push-pull shorting ... 1 9

TRANSFORMER, LOW-FREQUENCY

1—As described in "A.W." for February 10 ... 3 6

ACCESSORIES

BATTERIES

1—120-volt high-tension ... 11 0

1—9-volt grid-bias ... 1 0

1—2-volt accumulator ... 4 6

A Shilling a Station!

The Lucerne Ranger on Test

Station	Right-hand Dial	Station	Right-hand Dial
LONG WAVES			
Huizen	170	Poste Parisien	83
Paris	155	Breslau	86
Daventry	140	Brussels	88
Warsaw	128	Hamburg	90
Motala	103	London Regional	94
Luxembourg	79	Strasbourg	98
Oslo	46	Berlin	100
Croydon	28	Leipzig	105
MEDIUM WAVES			
Fecamp... ..	28	Toulouse	109
Lyons	31	Midland Regional	112
Milan	37	Munich	118
Juan les Pins	40	Rome	122
Trieste	47	Stockholm	124
Frankfurt	52	Sottens... ..	129 ¹
National	60	North Regional	136
Turin	62	Langenberg	138
Bari	65	Prague	148
Hilversum	76	Brussels	153
Genoa	78	Florence	156
West Regional	80	Vienna	161
		Muhlacker	166
		Athlone	169
		Budapest	172

WHAT do you think of my title for this test report? On this set, which I have just put through its paces, reception works out at less than a "bob a time." Cheap, isn't it?

No Bother or Fuss

I tried the set out at a spot due south of London and about 25 miles from Brookman's Park. No bother or fuss was taken in the installation business; the set was hooked up to quite an ordinary type of outdoor aerial, about 40 ft. long, in open surroundings, and the batteries and loud-speaker were connected up.

I found no snags and everything went according to plan. Medium waves were tried first—purely a matter of habit. First impressions always last the longest and the selectivity without any fiddling on the first run round the dials was, indeed, especially good. Berlin Funkstunde, which is only a few metres above London Regional, came in with only a very faint background of the powerful local.

I had, on the way home, fully digested the variable-selective properties of these Lucerne coils and I thought it would be a good test—and great fun—to try and get this Berlin station quite free. The tuner on the right—the grid tuner—was quite sharp enough, the spread of the local being only three degrees, but on the left-hand tuner—for the aerial—the selectivity, although quite good, did lend itself to improvement.

In accordance with the instructions of The Experimenters, I unscrewed the aerial coil from the base-board and disconnected the lead from the aerial terminal. Then with great care I took two complete turns off the bottom of the

aerial coil and gently replaced the coil in position.

When I got going again I immediately noticed an improvement in the selectivity of the left-hand tuner. Berlin was almost clear—not quite—but London was not strong enough to drown the noise from a German band.

After that the medium-wave test was all honey. Following the golden rule of turning the two dials in step, I toured the upper part of the waveband. No trouble and no difficulty. After Berlin Funkstunde came Milan, Scottish Regional, Leipzig, Midland, Munich and all the rest of the European brigade at real entertainment strength.

Top of the Medium Waves

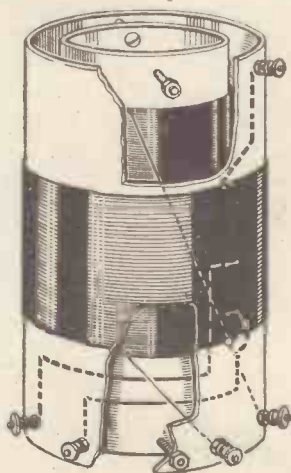
At the extreme top, Athlone, giving a sponsored programme (dance music, of course) was at good strength, but better still was Budapest with a delightful operatic concert at 172 on the right-hand dial. Plenty of room to spare at the top, you see.

Below London Regional, results were satisfactory. Let me draw your attention to the position of Fecamp, 28 degrees on the right-hand dial. Fecamp is now working on 206 metres so readers in the Plymouth, Bournemouth and Aberdeen areas will have literally tons of room to spare at the bottom of the dials.

Long waves provided good results, although perhaps not so startling as those on the medium band. With only 7 kilocycles separating Radio Paris and Kootwijk there was naturally some interference.

Radio Paris came in quite clearly, but there was a high-pitched whistle on Kootwijk.

D. Sr. J.



FULL CONSTRUCTIONAL DETAILS OF THE LUCERNE RANGER WERE GIVEN IN LAST WEEK'S "AMATEUR WIRELESS."

Getting Stations with the Lucerne Ranger

Continued from page 255

choose a low-impedance valve, you may get erratic reaction effects, particularly at the top end of the tuning scale.

When you start to tune in the stations you may for a moment be nonplussed, as Fécamp will probably come in at about 30 degrees—the point at which London National is usually heard. Of course, the reason for this displacement of settings is due to the wide tuning range of the coil.

Budapest, which is the highest wavelength station of note in the Lucerne Plan on the medium waves, usually comes in at about 170 degrees on this set—and not at the extreme end of the scale, as in most sets. All the stations you want are well within the tuning limits of the coils. This applies also to the long waves, Croydon on 900 metres having been logged at 28 degrees and Kootwijk, the longest wavelength station, coming in at 172 degrees.

Best Operating Sequence

You will find that the best plan in operating the two knobs for tuning is to search with VC_2 , keeping VC_1 fairly well in step. You can find the station only when VC_2 is accurately tuned, but a few degrees on VC_1 will not matter in this searching one way or the other, though finally you must, of course, make an accurate adjustment in order to get clear of interference.

An additional gadget suggested by some readers may prove of interest to others. The idea is to use a .0005-microfarad reaction-type condenser in series with the aerial lead and the coil point marked A. This condenser can be mounted on the panel on the left side of VC_1 . This idea is an alternative to varying the aerial-coupling coil turns. It has the advantage of variable selectivity.

If, for example, you make the set selective by reducing the aerial-coil tappings you get a degree of selectivity at certain parts of the band where it is not really needed—as when you are tuned well away from the locals.

By keeping the aerial selectivity fairly flat you can alter the selectivity at any part of the wavelength range to suit your local conditions. Foreigners that would perhaps be a trifle weak with a fixed degree of selectivity can be brought in at good strength by the aid of this additional adjustment.

We have been asked about the voltages for best results. On H.T. +1 we cannot give a definite figure. Usually 60 to 70 volts will be about right, but with different types of screen-grid valves it is hard to lay down any hard and fast limits. Start at, say, 45 volts and plug up to about 85 volts, coming back, then, to whichever voltage gives the maximum sensitivity.

High Voltage for Big Output

On H.T. +2 anything from 120 to 150 will do nicely—the higher the voltage the more undistorted volume you will get.

For grid bias we suggest 4.5 volts up to 7.5 volts on the power valve—use as much as you can in order to cut down the high-tension current. Using a super-power valve you will, of course, need anything up to 15 or 21 volts.

Now a final word about the Lucerne coils in other sets. For the Mullard Master Three we are putting out a blueprint with the coil conversions, No. AW424, price 1s. post paid.

The important point we must stress here is that if you are using a metal panel for your Master Three the low-tension switch, that is the one on the right-hand side, must be bushed with ebonite washers, otherwise the low-tension switch will not work.

We have had loads of people writing in asking for alterations for the Percy W. Harris Mascot set. They want to know how to use our Lucerne coils in this set, which has hand-pass coils. We will tell them next week.

Cutting Down Your Battery Consumption

In this article the AMATEUR WIRELESS Technical Staff gives you practical advice on reducing your high-tension costs—something that affects every battery user

WE'RE growing rather tired of all this moaning about the expense of renewing high-tension batteries—aren't you? Tired because it is all so unnecessary if you take a little care in systematically pruning the anode current of each valve stage in your set.

In this article we are not going to embroil ourselves in battery controversies but to explain how you can cut down anode current without losing sensitivity, quality or volume.

Let us take first the great question of maximum battery voltage. You know that when you go into a dealer's for a new battery he says, "120- or 150-volt, sir?" What do you say? Presumably if you can afford a 150-volt

quality in your output stage than the 120-volter. But you simply must look into each valve's anode current arrangements.

For a start, let us take for example a typical three-valver with a screen-grid, detector and pentode or power-valve output.

The first point to watch is the choice of valves. There are three or four different types for each stage, we mean. There is for the high-frequency stage in say the Cossor range the Cossor 215SG and the Cossor 220SG, both being straight screen-grid valves suitable for the average three-valve set.

When the 215SG is used with 150 volts high tension the anode current is nearly 2.5 milliamperes, but with the 220SG the anode current is a little over 3 milliamperes. You can save .5 milliampere—without losing any sensitivity at all.

This saving has been made without any question of skimping, just by carefully watching the anode current figures before purchasing the valve.

In just the same way you can choose your detector for battery economy. You can use either the PM1HL or the PM2DX in the Mullard range. With 100 volts actually on the anode of the PM1HL the current is 3 milliamperes, while the PM2DX with a similar high-tension voltage takes 5.5 milliamperes.

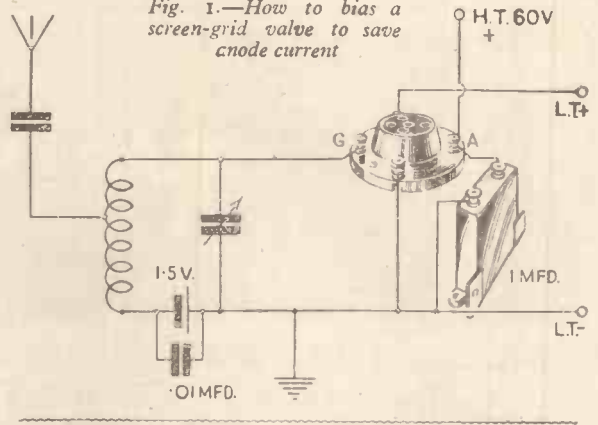
Now as the average three-valve set has not such a wonderful high-frequency gain that a low-impedance detector is needed, the PM1HL is in any case the right valve to use—and at the same time you save 2.5 milliamperes of anode current.

Now come to the power-valve stage. The PM2 valve takes 6.6 milliamperes while the PM2A takes 8 milliamperes—or a PM252 in the super-power class takes 17 milliamperes. All these figures are for 150 volts high tension. Here the choice is a matter for compromise.

You cannot save current unless you are prepared to sacrifice an amount of undistorted volume.

For the average three-valver the PM2A valve is probably the best, because it has a

Fig. 1.—How to bias a screen-grid valve to save anode current



high amplification factor, gives good quality without overloading because of its low impedance, and, if slightly overbiased to 7.5 volts, the anode current can be reduced to 6 milliamperes.

Saving 5 Milliamperes

So far, in choosing valves for our three-valver, we have saved a total on the three valves of 5 milliamperes, which is the difference between a standard- and double-capacity battery. In other words, a careful choice of valves will on its own cut down the current and so increase battery life very appreciably.

By the way, the valve curve given away with the valve tells you quite plainly all about these anode currents at different voltages, but if you cannot read them your local dealer will interpret for you.

We can now consider ways and means of cutting down the current of each stage by scientific attention to its operating conditions.

Screen-grid Bias

Go back for a moment to that 215SG mentioned as a typical screen grid. If we bias this valve with 1.5 volts negative, the anode current drops to .7 milliamperes, which is far more reasonable than the original 2.5 milliamperes. This is altogether discounting the slight drop in the screen current.

You may not know exactly how to arrange this biasing. It can be done by either of the two methods shown. The easiest way is to break the "earthy" end of the tuning coil connection to earth or moving plates of the tuning condenser and to insert a 1.5-volt grid-bias cell, with the negative side going to the coil and the positive side to earth as at Fig. 1.

A .01-microfarad condenser should be connected between the coil and earth as shown. Make quite sure that the moving plates of the condenser remain earthed.

Now for an alternative method. When the coil is internally connected or you cannot get at the set's connections very easily, the Fig. 2 system is the more convenient. Here you drop in a .0001-microfarad fixed condenser between the tuning condenser and coil point A and the control grid of the screen-grid valve. Then from the control grid take a 1-megohm grid leak to the negative side of a 1.5-volt grid battery, the positive side going to earth.

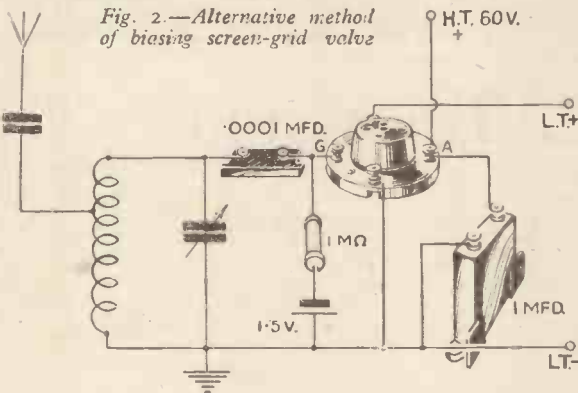
If you are using a variable-mu type of screen-grid valve you will of course already have some form of variable bias on the control grid.

But remember that the current increases as you reduce the bias to increase volume.

Therefore do not increase volume on the variable-mu control more than you need, otherwise there will be a waste of current. Make sure, that is, to turn up all other controls, such as aerial input and reaction, before you resort to an increase in variable-

Continued on page 262

Fig. 2.—Alternative method of biasing screen-grid valve



battery you get that, but do you realise exactly how this increases your anode current?

Take a Cossor 220P power valve to illustrate our point. At 150 volts high tension the anode current is 10 milliamperes, whereas with 120 volts high tension it is only 7.5 milliamperes. Well, you might say, that is only 2.5 milliamperes difference, so why worry?

The answer is that the power valve is not the only valve to be considered. With 15 volts high tension applied, that is about 100 volts on the anode after going through the anode impedance, the detector—say a PM2DX—takes 5.25 milliamperes, whereas with only 120 volts applied the anode current is a little under 3 milliamperes—a saving of over 2 milliamperes.

Admittedly, with a screen-grid valve the saving is not so appreciable, but we can say that with a three-valver the difference in total anode current between using a 150- and 120-volt battery is easily 6 milliamperes.

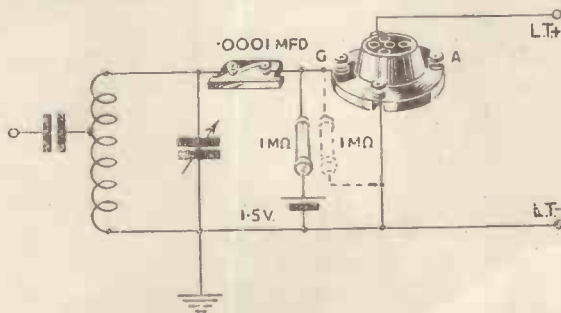
Running Down the Battery

In other words if you buy a standard-capacity battery it will run down very much more quickly if its maximum voltage is 150.

It is quite possible that, dropping down to 120 volts, you may be able to run fairly economically from a standard battery, whereas with 150 volts the total drain might be too much for reasonable service.

Don't think that we are advising you against the 150-volt battery. If you take care to cut down the anode current at all points this battery will give you better

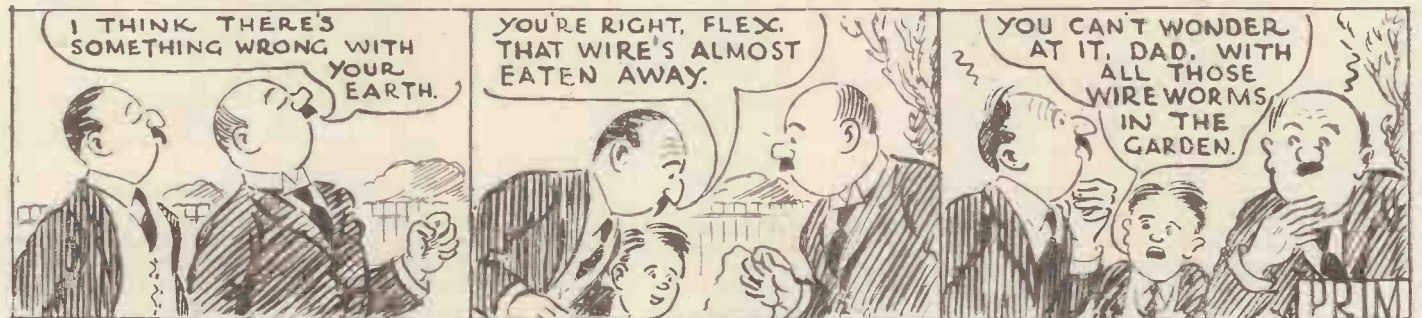
Fig. 3.—"Doctoring" the detector stage of the set by adding a slight negative bias, thus cutting down the anode current and so helping to lengthen the life of the battery



Mr. Flex Discovers Something Wrong—



—With a Lad's Education



More Room for B.B.C. Television

AS I climbed the stairs of the Regency town house known as Number Sixteen Portland Place (*writes Alan Hunter*) I heard sounds of song and dance. It was the first rehearsal of a television act in the new B.B.C. studio.

Opened the solid drawing-room door—relic of a bygone spacious age—to find myself amidst a crowd of artists and engineers. All busily accustoming themselves to new conditions, all revelling in so much airy space—for the lately vacated studio BB in the basement of the broadcasting tower was indeed cramped.

Those vivacious Eight Dancing Relatives, as Whitaker-Wilson calls them, were treading a measure to the stern but kindly promptings of Mrs. Rodney Hudson.

Fetle but dynamic Anona Winn was attractively posing before the television "gun" in rehearsal of her singing act.

Devilish Make-up!

Handsome Robert Algar, white faced with the devilish make-up demanded by television, stood by until his turn came to face the fring party—I mean the television gun.

Inside the adjoining control room, so infinitely larger than the poky little hole attached to Studio BB, worked the feverish engineers, turning this and that knob to get the 30-line television apparatus shipshape for the evening's transmission from London National.

One end of the drawing-room painted white, to act as a background screen for the performers. Facing it, at the other end, the scan-

ning projector apparatus and the torpedo-shaped condenser microphone, to catch light and sound simultaneously, so that every ardent television enthusiast might see as well as hear the acts performed in the studio.

Lights dimmed. The familiar whirring of the mirror-drum scanning apparatus. Giant black bands racing one another across the white screen, like the shadows of crazy iron railings on the move.

"The Circus Comes to Town." That is only the name of the song and dance scena being rehearsed, of course. The Eight Step Sisters fall into line, go through their well-learned act—and I slip away to the control room to see how all this looks.

As always, I am amazed at the sight. There

is everything on the screen I have just seen in the studio. This 30-line television, though far from perfect, has progressed very far.

Messrs. Birkinshaw and Campbell, B.B.C. television engineers, can be proud of what they have accomplished with the Baird system. It will be a thousand pities if, as the B.B.C. threatens, the present four nights a week transmissions are in any way curtailed.

Out in the studio again, I pinned down Eustace Robb, Television Director. "How will this new studio help you?" I demanded.

"I shall be able to arrange faster-moving shows," he promised. "All this extra room will give me more scope, especially for dancing and suchlike acts." Robert Algar, off the "set" for a moment, recalled how terrified he had been at his first television show. "Not now," he added, "for I have done well over twenty shows since."

"I used to bring a little mongrel dog with me—called Scruff. But he got a bit too frisky, so I came alone. Would you believe it, a looker wrote from *Newcasile* to ask what had happened to my little dog!"

Anona Winn obviously enjoyed herself. I asked her why. "How do I like being televised? Why, I love it. It's something new, you see, and I love doing new things!"

Then I got talking to a pleasant young man with a most attractive voice. "And what are you in this racket?" I asked. "Oh, I'm the new television announcer," he smiled. D. A. Sullivan is his name.

Yes, television is growing—cannot help doing so, with all this intensive effort.



Kitching & Clayton photo

(Left) No. 16 Portland Place, home of the new television studio. (Below) New Cossor tube for cathode-ray television system

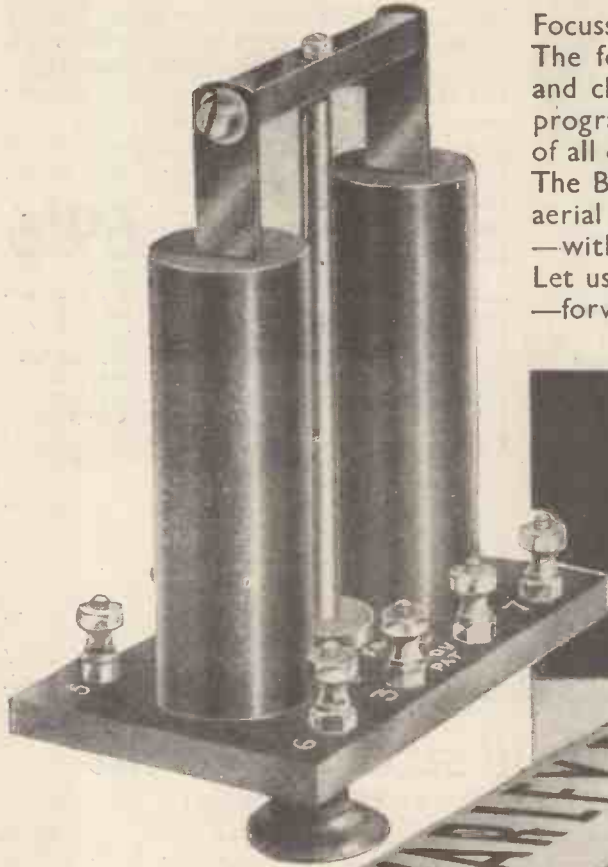


Keystone photo

AND
NOW

BIFOCAL

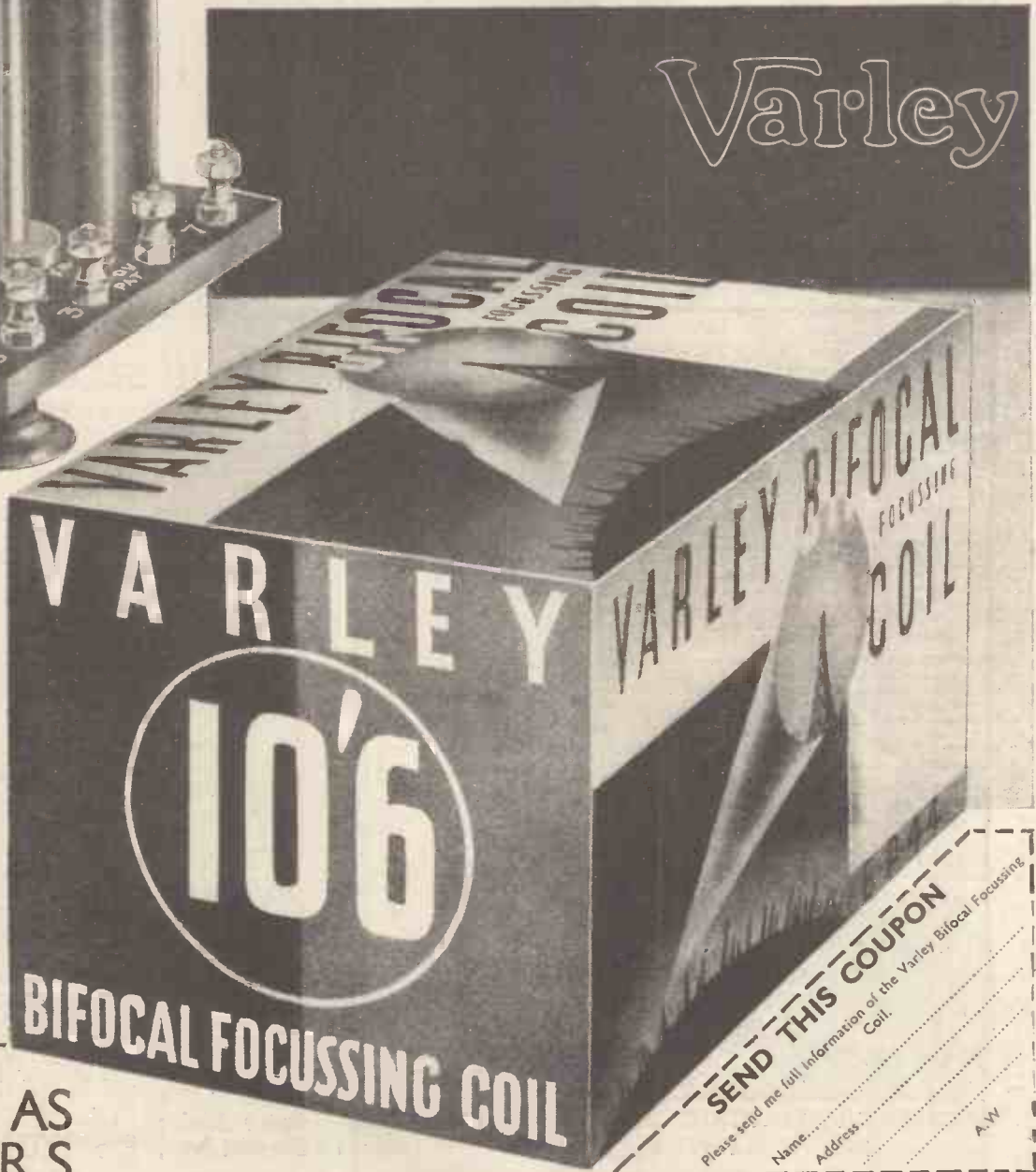
FOCUSSING COILS



Focussed Radio—the most momentous development for years. The formidable possibility of station re-shuffling—the congestion and chaos of the ether—all this may be forgotten! Choose your programme—focus it—then *listen* to it—to the complete exclusion of all others.

The Bifocal Focussing Coil—a tuning device whereby the optimum aerial coupling can be selected by simply pulling a knob in and out—without altering the setting of the reaction control.

Let us send you further information of this remarkable component—forward the coupon to-day.



FOREMOST AS PIONEERS

Advertisement of Oliver Pell, Control, Ltd., Kingsway House, 103 Kingsway, London, W.C.2. Telephone: Hol. 5303

It greatly simplifies set building

LINACORE



The J.B. Linacore employs the latest type of iron-cored coils. It greatly simplifies set building, making the most of its super selective coils by accurate matching of condenser sections. Send coupon to-day for free Blueprints of an ideal battery or mains model Linacore circuit. Enclose 2d. only for postage. For Battery receivers type B.P.B. (as illustrated) **69/6**
For Mains receivers type B.P.M.

To JACKSON BROS.,
(London) Ltd., 72 St. Thomas Street, London, S.E.1.

Please send Free Blueprint of Battery Model (Delete one not required)
Mains Model

I enclose 2d. in stamps for postage.

NAME

ADDRESS

A.W.

Advertisement of Jackson Bros. (London) Ltd., 72 St. Thomas Street, London, S.E.1 Telephone: Hop. 1837

WHAT SET IS YOURS?

FOR EVERY SET ON THE MARKET THERE IS A SUPER-LIFE GROSVENOR BATTERY

For instance is yours a

KOLSTER BRANDES
There is a Super-Life Grosvenor for every Kolster Brandes Model. Ask your dealer.

KOLSTER BRANDES K.B.247 Pup. Ask for Grosvenor DBA546 (99+7½ v.) ... 10/-
KOLSTER BRANDES Hika Trans. S.G.4. Ask for Grosvenor DBA546 (99+7½ v.) ... 10/-
MURPHY B4. Ask for Grosvenor DBA 294 (108 v.) ... 13/-
MURPHY B.5. Ask for Grosvenor DBA539 (135+9 v.) ... 13/-

WHATEVER the make, you would get the most out of your set with a Grosvenor Battery. A Grosvenor would give it just the silent super-abundant power it needs—and last far longer than any battery you have ever had. The Grosvenor MERCURY process is the secret; guarding against corrosion and enabling the cells to be hydraulically crammed with extra chemicals.

Next time, insist on a Grosvenor. There is one made for your own particular set!

or, if yours is a

MURPHY

your dealer has a Super-Life Grosvenor made specially for your set.

Mercury-protected cells make it
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On Your Wavelength

By Thermion

More Radio Conferences

AS I write, the special conference convened by the International Broadcasting Union is sitting at Geneva in an endeavour to remove the snags from the path of the Lucerne Plan. If they don't succeed, a further International Conference is likely to be called.

At the present time there are three main bits of bother. The first concerns the interlopers and the wavelength grabbers whose doings have produced the horrid mess that exists on the long waves.

The second is the inability of a good many of the smaller stations on the medium waveband to keep to their allotted frequencies.

The third is wrapped up with the very knotty problem of the Russian stations.

Russian Problem

RUSSIA is a gigantic country, extending, as we used to learn in geography lessons, over a large part of both Europe and Asia. For the purpose of the Lucerne Plan an imaginary line was drawn separating European from Asiatic Russia, and the U.S.S.R. agreed that stations situated to the west of this line should accept the Lucerne Plan and work according to its provisions.

This undertaking has been loyally carried out in the great majority of cases. But unfortunately no matter how many imaginary lines you may draw on the map you cannot keep wireless waves inside them.

Russia has a great many stations—some of them very powerful—east of this line, and not a few of these are causing interference with medium-wave European stations. It is difficult to see what can be done to remedy matters.

Wavelength Wobblers

THE country with the worst record in wavelength wobbling at the moment is Spain. There is, in fact, hardly a Spanish station which is adhering exactly to its proper channel.

I don't think that the wobbling is deliberate; it is probably due to the fact that many of the transmitters are too antiquated to be able to work to a tolerance of 50 cycles—and as for 10 cycles, well!

Matters should improve as the apparatus is brought up to date by the installation of tuning-fork or crystal control.

A particularly bad case of wandering is that not of a Spanish but of a French station. I refer to Radio LL, which has always been one of Europe's bad boys.

Ever since it came on the air a good many years ago this station has erred and strayed over the medium waveband, heterodyning all and sundry. Now it is working rather more than 2 metres above its proper wavelength, which brings it just in between two Lucerne channels.

Let's hope that the present French Government will be

strong enough to sort out wayward stations.

Batteries Again!

A READER asks me why I cannot be fair and publish the figures of the good-quality battery tested under exactly the same conditions as the original five-bob 120-volter. The reason why the figures haven't been given before is that the battery has still been going strong.

The two were tested under precisely the same conditions, the same resistances having actually been used in both cases. Here are the comparative figures:

Five-shilling Battery: Total service hours 130 (32½ days at four hours a day); watt-hours per cell, 1.2.

Good-quality Battery: Total service hours 200 (50 days at four hours a day); watt-hours per cell, 1.875.

There is some difference, is there not? One interesting feature is the way in which the good battery scores in the matter of voltage drop between the beginning and the end of a four hours' run.

With the five-shilling battery this drop was enormous, sufficient in fact to make end-of-the-evening distortion inevitable; the good battery made a very much better showing.

What My Tests Show

IT would not be fair to generalise merely on two isolated tests. But they aren't isolated. They are members of a series of over a thousand that I have conducted. They bear out what I have always maintained—that you cannot economically take 10 milliamperes out of any standard-capacity battery, no matter how good its quality may be.

If you insist upon doing so, you will obtain

better value for your money by purchasing a good battery, but the wisest course is to use a triple-capacity battery if your set requires more than 5 milliamperes of high-tension current.

It costs about one and a half times as much as the standard capacity and its service life under a fairly heavy discharge is at least three or four times as great.

I have a good triple-capacity battery going through the same test at the moment. It has now done 37 days, or 148 hours. The voltage under load is still 108 out of 120.

Further, whereas the five-shilling battery showed an average voltage drop of some 10 volts and the good-quality standard-capacity "H.T.B." a drop of about 7 during each four-hour run, the drop in the case of the triple capacity battery averages 4.2 volts.

And here is a point of real importance. For the past sixteen days there has been no appreciable variation in the voltage of the triple under test. The reading under load at the beginning of the four-hours' run was exactly the same to-day as it was more than a fortnight ago; the reading, again under load, at the end of the four-hours' run is also what it was sixteen days ago.

One More Test

MY apologies if I bore you with all this business about high-tension batteries. I hope that I don't, for to-day it is such a pressing problem that it deserves more than a little attention.

In a recent issue, the Rickmansworth reader who started the correspondence gave some further figures about his batteries. He has had, he says, three five-bobbers in thirty-four weeks, using them on the average 40 hours a week and taking 7 milliamperes from them—in his original letter to me he gave the figure as 100 milliamperes.

Very well, then. Here's a test that should set all doubts at rest. I have purchased two of these batteries from the shop from which this reader obtains his supplies—two in case one should prove to be a "dud."

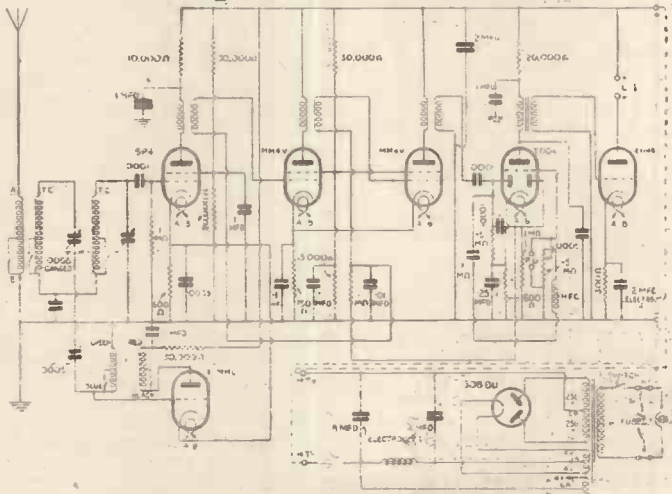
Further, I have made up two carefully matched resistances that allow exactly 7 milliamperes of current to pass at the nominal E.M.F. of these batteries when new.

I am going to run them every day for eleven weeks for six hours and each week I will report in these columns just what the starting and ending voltage is. You will thus be able to see for yourselves exactly what is the condition of a five-bob 120-volt battery after so many weeks of service.

More Dud Components

HERE is a true story of the sad adventures of a friend of mine. He decided recently to make up a superhet of excellent design and purchased all the specified components, including an expensive set of coils. He is an old hand at the

The Super Circuit for 1934



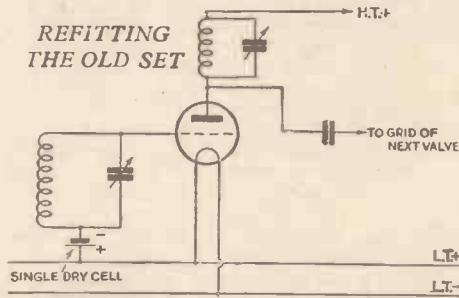
Here is the complete circuit of the 1934 A.C. Century Super, described on pages 264-265. Full constructional details, together with layout and wiring guides, will be given next week. From this diagram you will see that there are seven valves, including the mains rectifier. A double-diode-triode is used in the second detector position, providing the latest form of self-adjusting volume control.

game and does not make many mistakes.

When the set was finished and tried out it produced nothing but shrieks of silence. Careful checking of the wiring showed that nothing was wrong with that.

The coils were suspected and in course of time returned to the makers for examination. The makers sent them back with a covering letter that they had been tried out and found in perfect condition.

As the set still refused to function, the coils were sent to an independent expert for examination. He reported (a) that in the aerial portion of the band-pass pair one lead was connected to its terminal by nothing more than a blob of soldering flux; and (b) that in the grid portion of the pair there was no path



Connecting a dry cell to make a new valve work in an old set

for current between the "in" and "out" terminals.

This kind of thing is a positive scandal. It is, I believe, mainly owing to the sale of "dud" components that interest in home construction is not what it was.

Refitting the Old Set

ONE of the difficulties that besets the user of a set two or three years old is that new valves are generally rather too good for its aged works. The veteran was designed at a time when valves had not nearly the mutual conductance that they now possess.

It is no uncommon thing to find that when you stick new valves into old holders the only result is a loud and impressive silence. This is especially likely in sets of the tuned-anode type whose valves were held down by a hefty positive bias on their grids.

Modern valves simply refuse to work when treated in this way. The only thing to do is to reduce the positive bias. You must have some, for if you take the grid return straight across to negative the set will probably howl the place down.

A tip that I have often found useful is to connect a single dry cell in opposition, that is, with its positive joined to the positive filament busbar. You then take the "bottom" end of the coil to the negative of the dry cell. The result is $+2$ volts $-1\frac{1}{2}$ volts, or $\frac{1}{2}$ -volt positive bias. The little diagram above makes the process plain.

Clever Wireless Stunt

HAVE you, I wonder, received a mysterious little parcel containing a letter wrapped round a perfectly ordinary bakelite knob? Thousands of people have, and, to my mind, it is one of the cleverest advertising stunts of recent months.

The recipient is asked to turn the knob very slowly to the right and then very slowly to the left. He does so rather mystified, and then reads on. "Do you realise," the letter asks, "that you have done sufficient to tune in the finest of singers or the most thrilling of sporting commentaries, if only that knob was attached to the set to which it belongs?"

Now it is up to some maker of motor-cars to send out mystery steering wheels.

Road Radio

ALTHOUGH wireless for motor-cars is only just beginning to "take on" over here, there seems to be no doubt of its popularity in the States, where it is officially claimed that no less than 700,000 automobile radio sets were fitted last year. Of course, the New York police prohibition against the use of radio in taxis came as a rather nasty "jolt," but I understand that the ban has recently been withdrawn, and all is now smooth sailing.

The only restrictions are that loud-speaker volume must be kept within reasonable limits whilst actually "on the road," and that the set must not be used whilst the driver is waiting for a fare—either for his own amusement or as a subtle form of soliciting custom.

About Humming

I SUPPOSE nobody likes noise in bulk, but it is curious how much more sensitive some people are than others to small noises of the persistent kind. Have you ever noticed, for instance, how quickly the owner-driver of a motor-car will cock his ears at a new squeak or rattle too faint to be heard by anyone else? On the other hand, there are people who can sleep soundly through the noise, say, of traffic and others who can't.

These reflections are prompted by the fact that on more than one occasion recently I have been called in to prescribe for hum on an all-mains set when, in my opinion, there was really no ground for complaint.

One must expect to get a slight "purring" from the loud-speaker on any mains-driven set during the "silent" period, and so long as it rests at that no harm is done. Of course, the first time one uses an all-mains set, even a slight hum sounds a bit obtrusive compared with the dead silent background of the battery-driven set, but one soon learns first to ignore and then to forget it.

—And Drumming.

BY contrast with the subdued hum which can be tolerated, there is the hefty kind of drumming which comes through even on top of the programme. This is due to insufficient smoothing or decoupling, and must be got rid of by hook or by crook, because, quite apart

Cutting Down Your Battery Consumption

Continued from page 257

mu stage gain by decreasing control grid bias.

We come now to the "doctoring" of the detector stage. If you are using the PM1HL type of valve at this point with 100 volts high tension actually on the anode the consumption is about 3 milliamperes, but if this is biased by 1.5 volts negative the current drops to 1 milliampere. At this bias figure the valve will handle all the input you are likely to apply, so that you lose nothing in performance though you gain quite definitely in reduced anode current.

For this detector biasing the system is almost the same as Fig. 2. You already have a grid condenser and leak for detection, with the leak taken either to positive or negative low tension. Just remove the grid leak from the low tension and take it to the negative side of a 1.5-volt cell, the positive side of which is earthed as before.

When we come to the final stage there is not a lot we can do to cut down the anode current—unless you resort to such systems as class B, Q.P.P. and Westector economisers. We would stress that these systems aim more at giving you greater volume than usual than at cutting down the absolute current.

If your volume needs are modest there is no need to go to 150 volts. You can get all you want from 120 volts, and you will save current. Another way of arriving at the same condition is to overbias the valve by 1.5 to 3 volts. A

from being objectionable in itself, it tends to throw an unnecessary load on the valves.

Sometimes it makes its appearance in rather a mysterious fashion. For instance, I remember one case in which the owner of an all-mains set invested in a new loud-speaker, only to discover that with the speaker he had "bought" himself a new and vigorous hum. Of course the real source of the trouble had been present all along, though it was previously camouflaged. The new loud-speaker, being so much more responsive to a 50-cycle note than the old, simply served to bring out the weakness for the first time.

Wrong Notion About S.A.V.C.

IN spite of the fact that S.A.V.C. is being featured in nearly every new set, there are people who still seem to have the strange idea that it tends to "flatten out" the signal itself, and to reduce *fortissimo* and *pianissimo* passages to the same level.

If true this would destroy the correct "balance" of orchestral music and rob speech of all character.

S.A.V.C. quite obviously does nothing of the sort. It regulates the strength of the received signal by pumping the amplitude of the carrier wave up or down as required, but leaves the depth of modulation (that is, the relative loudness or softness of consecutive passages) quite unaltered.

Highest Licence Percentage

DENMARK is only a small country, but it is said to have a higher proportion of broadcast listeners to total population than any other nation in the world. Perhaps this is because it has developed a system which gives each listener a more direct voice in the selection of the programmes.

Control is in the hands of a number of directors, half of whom are elected by the listeners themselves, whilst the remainder are appointed to represent certain rational interests such as the Minister of Education, the Press, etc.

The result is that everybody is definitely radio-minded and keen on keeping the programmes up to scratch. I wonder how a scheme of that sort would work out over here?

PM2 with 120 volts high tension can save you a milliampere by increasing the bias by 1.5 volts.

Now another point. You may suggest that a small pentode will give more volume per milliampere anode current than the power valve. That is true, but we find that a pentode cannot be overbiased to the same extent as a power valve without spoiling the quality.

Economising with a Pentode

If you are using a pentode the only way to cut down its anode current in a simple set is to reduce the anode voltage and leave the bias correct for that voltage. The Mullard PM22A pentode, for example, has been designed to run from a 100-volt battery and still give good quality. At this voltage it consumes only 4.5 milliamperes.

From what we have said you will see that it is possible to cut down the overall current consumption to about 7 milliamperes, which is just within the capabilities of a standard-capacity battery. By ignoring these points you may easily mount up the current to 12 or so milliamperes, and thus reduce the life of the battery by at least a half.

Your first attack on battery problems is to choose valves that give you good performance with the minimum of anode current. Then, having made such a good start, see that you work your valves so that no needless wastage of current occurs at the high-frequency, detector and low-frequency stages.

Ornamenting Your Loud-speaker Fret

THERE is no reason why a loud-speaker should not be ornamental as well as useful. The illustrations to this article show a very novel and attractive method of decoration which will transform the plainest home-built loud-speaker into a strikingly artistic addition to the furnishing scheme.

A baffle or cabinet with a plain circular, square, or rectangular aperture is used. The ornament consists of a simple, decorative design, such as a spray of leaves, fashioned out of thin aluminium foil, lacquered or enamelled in bright, pleasing colours, and firmly secured to the tinsel fabric or silk backing which covers the aperture.

Two snags might, perhaps, be anticipated in

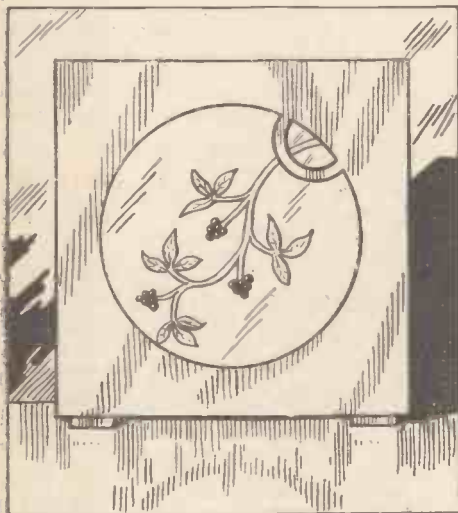


Fig. 2.—Appearance of the finished decoration

connection with this idea. One is that the ornament might tend to obstruct the sound (as an ornamental fret with heavy, solid portions in its design sometimes does). I find, however, in actual practice that, if the aluminium cut-out design is of a reasonably open character, no detrimental effect on sound distribution is perceptible to the ear.

The other possible snag is that, in view of the light, flimsy nature of the metal foil, one might expect it to vibrate in sympathy with the loud-speaker diaphragm and produce a

"zizzing" noise on loud passages of music, etc. But here, again, actual experience with a properly constructed loud-speaker has shown that no such trouble occurs in practice, provided, of course, that the ornament is adequately secured to the background material.

The materials required for this novel scheme of decoration are very simple and cost but a shilling or so at the most. They comprise a sheet of aluminium foil (not too thick and not too thin!), some bright Oriental lacquers or art enamels in suitable tints, and some strong liquid glue or seccotine.

A scribe, a camel-hair paint brush, and an old pair of scissors are all the tools needed.

A suggestion for a suitable design is given in Fig. 1. This can be sketched out to any required scale on squared paper and then transferred to the aluminium by placing the foil under the paper and going over the outline with the scribe, pressing rather heavily.

The design should be cut out very carefully with the scissors (thin aluminium foil, of course, cuts nearly as easily as paper), and then the metal can be suitably tinted with the lacquer or enamel. If the leaves are coloured in "autumn" tints of green, yellow, brown,

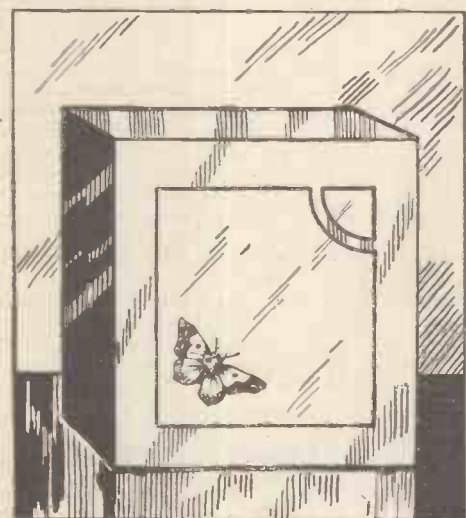


Fig. 3.—Charming effect obtained by a butterfly cut out of aluminium foil

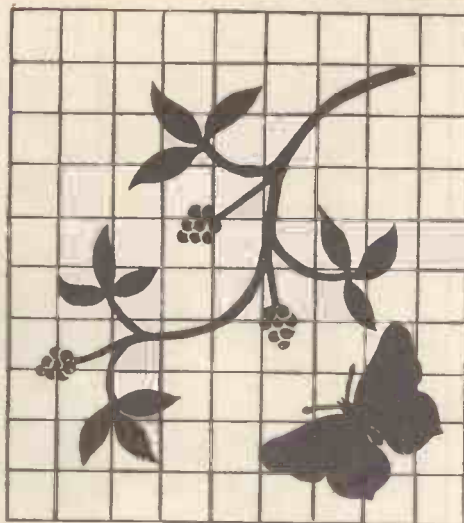


Fig. 1.—Suggestion for a suitable design, which can be sketched out to any required scale on squared paper

etc., and the clusters of berries in bright vermilion or black (leaving a tiny "high-light" on each berry to give the appearance of roundness), a most striking and effective contrast results.

To give additional realism, the midribs and veining of the leaves and the outlines of the individual berries can be embossed on the design by means of the scribe; this is best done before the painting of the metal.

When the enamel or lacquer is quite dry, the ornament can be secured to the fabric which covers the baffle opening. Glue or seccotine is usually sufficient to hold the light foil securely in place; but if necessary it can be still further secured with the aid of a needle and thread, "anchoring" the stems of the spray at strategic points.

Exercise Your Ingenuity!

The appearance of the finished decoration is shown in Fig. 2. Of course, there is no need to stick to a leaf-spray design; with a little ingenuity a variety of suitable designs can be evolved. Fig. 3 shows the charming effect attained very simply by decorating a plain square baffle aperture with a brightly coloured butterfly cut out of aluminium foil.

Some of the Oriental lacquers now on the market are useful for giving an artistic and very easily applied finish to the woodwork of a home-built loud-speaker cabinet and, naturally, this style of finish looks particularly well in conjunction with the type of coloured ornamentation described.

V. E. O.

Broadcast Wavelengths

This week we give details of the principal short-waves and the European long-wave stations. Next week we shall publish a list of medium-wave transmitters.

Principal Short-wavers

Metres	Kilo-cycles	Station and Call Sign	Country
16.86	17,790	Daventry (GSG)	Great Britain
16.878	17,780	Boundbrook (W3XAL) N	United States
16.88	17,775	Huizen (PHI)	Holland
16.89	17,760	Zeesen (DJE)	Germany
19.56	15,330	Schenectady (W2XAD)	United States
19.68	15,234	Paris (Coloniale) (FYA)	France
19.72	15,210	East Pittsburgh (KDKA)	United States
19.73	15,200	Zeesen (DJB)	Germany
19.82	15,140	Daventry (GSF)	Great Britain
19.84	15,120	Vatican (HVJ)	Italy
25.00	12,000	Moscow (RNE)	U.S.S.R.
25.25	11,880	Paris (FYA)	France
25.27	11,870	E. Pittsburgh (WBXX)	United States
25.28	11,865	Daventry (GSE)	Great Britain
25.40	11,810	Rome (2RO)	Italy
25.53	11,750	Daventry (GSD)	Great Britain
25.57	11,730	Huizen (PHI)	Holland
25.63	11,705	Paris (Coloniale)	France
30.0	10,000	Madrid (EAG)	Spain
31.25	9,600	Lisbon (CTIAA)	Portugal
31.28	9,590	Philadelphia (W3XAU)	United States
31.28	9,590	Sydney (VK2ME)	New South Wales

Metres	Kilo-cycles	Station and Call Sign	Country
31.297	9,585	Daventry (GSC)	Great Britain
31.35	9,570	Boston (W1XAZ)	United States
31.38	9,560	Zeesen (DJA)	Germany
31.48	9,530	Schenectady (W2XAF)	United States
31.545	9,510	Daventry (GSB)	Great Britain
31.55	9,510	Melbourne (VK3ME)	Victoria
37.33	8,035	Rabat (CNR)	Morocco
38.47	7,797	Radio Nations (HBP)	Switzerland
38.65	7,765	Kootwijk (PDM)	Holland
42.92	6,880	Oslo (LCL)	Norway
43.86	6,840	Budapest (HAT2)	Hungary
45.38	6,610	Moscow (RW72)	U.S.S.R.
45.40	6,593	Bucarest	Roumania
46.69	6,425	Boundbrook (W3XL)	United States
48.86	6,140	Pittsburgh (WBXX)	United States
49.02	6,120	Wayne (W2XE)	United States
49.18	6,110	Chicago (W9XF)	United States
49.18	6,110	Boundbrook (W3XAL)	United States
49.22	6,095	Bowmanville (VE9GW)	Canada
49.4	6,073	Skamleback (OXY)	Denmark
49.47	6,065	Nairobi (VQ7LO)	Kenya Colony
49.59	6,050	Daventry (GSA)	Great Britain
49.83	6,020	Zeesen (DJC)	Germany
50.0	6,000	Moscow (RNE)	U.S.S.R.
50.26	5,969	Vatican (HVJ)	Italy

Long-wave Stations

Metres	Kilo-cycles	Station and Call Sign	Country	Pwr. (Kw.)
1,107	271	Moscow (RCZ)	U.S.S.R.	100
1,176	255	Oslo	Norway	60
1,224	245	Leningrad	U.S.S.R.	100.0
1,261	238	Kalundborg	Denmark	30
1,304	230	Radio Luxembourg	Grand Duchy	200.0
1,345	223	Kharkov	U.S.S.R.	35.0
1,357	221	Motala	Sweden	30
1,389	216	Eiffel Tower (Paris)	France	15.0
1,415	212	Warsaw	Poland	120
1,442	208	Warsaw	U.S.S.R.	35.0
1,500	200	Daventry National	Great Britain	7
1,554	193	Ankara	Turkey	7
1,570.7	191	Konigswusterhausen	Germany	60
1,613	186	Istanbul	Turkey	5.0
1,639	183	Reykjavik	Iceland	21
1,714	175	Moscow (I)	U.S.S.R.	500
1,796	167	Radio Paris	France	80
1,797	166.9	Lahti	Finland	40
1,875	160	Kootwijk (Hilversum prog.)	Holland	50
1,875	160	Brasov	Roumania	20.0
1,935	155	Kaunas	Lithuania	7

||||| We Announce a New Design |||||



Putting the valves in the 1934 A.C. Century Super, which closely follows the original battery version. Note the mains unit on the left

FOLLOWING the extraordinary interest created by the production of a new battery version of the famous Century Super by "The Experimenters," we have been inundated with requests for a mains version. "The Experimenters," having new worlds to conquer, therefore passed over to us the job of producing a Century Super for mains working on the lines of their battery set.

Following the Battery Version

The main idea has been to make the A.C. version follow as closely as possible the lines of the battery model, particularly as regards components and layout. The object being, of course, to enable anyone with a battery model to convert at minimum cost to mains working—as well as giving mains users the undoubted benefits of the very fine layout arrangement conceived by our inimitable contributors.

The circuit, of which a theoretical diagram is given on page 261, is practically the same as the battery version.

We will now give you a complete analysis of the circuit. The first valve in the sequence is an SP₄ high-frequency pentode. It acts as the first detector of the super-het arrangement, and has the usual leaky-grid circuit.

The grid bias for this valve is obtained automatically by a resistance in the cathode lead, the value being 600 ohms.

Next in the sequence is the separate frequency-changer valve. This is a very important point in the circuit. We could, of course, use a combined detector and frequency changer, thus reducing the number of valves, but from experience we have found that second-channel and background noises are so greatly increased that the slight saving in valve stages is more than offset.

So here we have a 41MHL triode valve as frequency changer, arranged on the cathode-coupling principle—the only system worth considering with a triode oscillator.

We now come to two intermediate-frequency valves, both of the variable-mu type, Mullard MM₄V's.

The 1934 A.C.

Specially Designed by the "Amo"

- ★ Six of the latest mains valves give amazing volume.
- ★ Self-adjusting volume control is incorporated.
- ★ Pick-up terminals for gramophone.
- ★ Separate oscillator for pass tuning is

These are band-pass coupled, the band-pass frequency being 126 kilocycles, a 9-kilocycle separation being provided so that the circuit is fully capable of operating at maximum efficiency under the Lucerne Plan.

The fourth valve is another highly important stage. It is a three-in-one tube, a Mullard TDD₄, a double-diode-triode. One diode is used as the second detector; as you know, this type of valve gives quite distortionless detection. Its disadvantage is its very small output. To overcome this the triode portion of the three-in-one valve is connected so that it amplifies the output of the diode before the signals reach the output stage.

The second diode is connected for self-adjusting volume control. It controls the amplification of the two intermediate-frequency valves, so that fluctuating signals are evened up, and many foreigners come in just as clearly and as reliably as the nearby locals.

The triode portion of the three-in-one valve is transformer-coupled to the triode output valve. You may wonder why a triode has been used in preference to a pentode. The reason is that we do not need any more amplification at the last stage, and so we can take advantage of the better quality of a

triode with its lower amplification factor.

Lastly, there is the mains unit, which is separate, and includes the mains transformer, 506BU rectifying valve, two electrolytic condensers, and a smoothing choke.

This mains unit has an output of 250 volts at 60 milliamperes, providing plenty of juice for all the six receiving valves—and that no doubt accounts for the wonderful quality commented upon by impartial testers.

Decoupling and Voltage Dropping

Decoupling and voltage-dropping resistances were very carefully worked out. When you apply 250 volts to the positive and negative terminals of the receiver this potential is dropped to give 200 volts on the power valve and the correct anode and grid voltages throughout the set.

It also enables the voltage on the screen of the first detector and two intermediate-frequency valves to be reduced from the maximum of 250 volts to their correct working voltage of 60 to 70 volts. There are no straggling high-tension wires, only one high-tension positive and one high-tension negative.

You may wonder why the volume control is on the low-frequency side instead of being across the screen-grid valves as is the more usual practice. There are various reasons for this departure. We wanted the volume control to work on both radio and gramophone, but unfortunately this was not possible owing to instability.

At the same time a high-frequency volume control is perhaps a little unnecessary on a set with self-adjusting volume control.

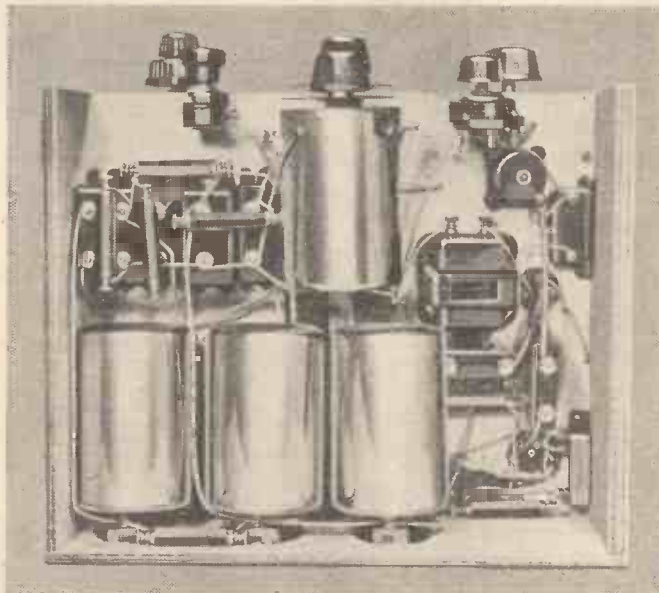
So you see our volume control regulates the input to the grid of the triode portion of the second detector. This gives us a smooth control on radio, and adjusts the volume so that every incoming signal is handled without any distortion.

A Pick-up Point

A point to be remembered is that the pick-up must not be left connected to the pick-up terminals during radio reception, because the resistance of the pick-up will, of course, damp out or shunt radio-frequency currents to earth.

So much for a brief analysis of the theoretical circuit, which you will find printed on page 261. As you will have gathered, this circuit represents the latest developments in super-het technique. It has been designed to embody all of the most outstanding ideas that have been found of value in the past few months.

Some of the more recent and therefore not thoroughly tried-out ideas have been purposely omitted,



This photograph gives a good idea of the compact arrangement of the under-side of the baseboard-chassis assembly

Full Constructional Details Next Week

Century Super

Amateur Wireless" Technical Staff

als are provided
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lator and band-
employed.

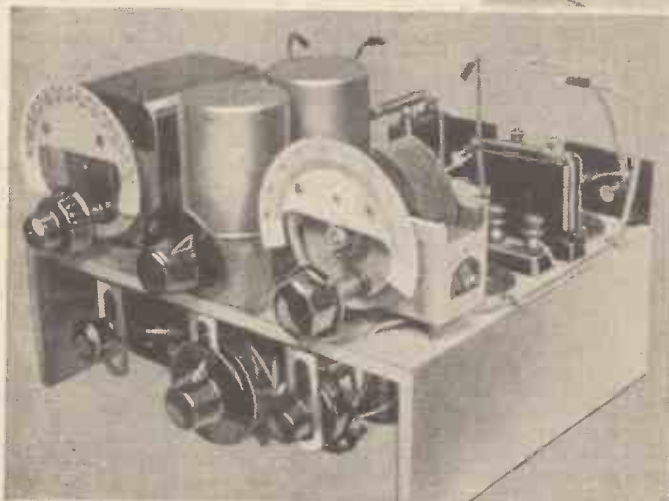
- ★ Nine tuned circuits ensure adequate selectivity.
- ★ Baseboard-chassis construction gives efficiency and simplicity.

because we did want this to be a really sound design, free from the snags that seemed inseparable from some of the earlier models of the super-het class.

Ever in our thoughts was the question of cost. We knew that readers would not want to spend more money than was absolutely necessary on the set, and the idea of putting in some new-fangled idea just for the sake of saying it was new did not appeal to us.

In this circuit, which we want you to examine at your leisure during the coming week, you will see that the most important development of recent years has been embodied—self-adjusting volume control.

We have used some of the latest valves, not be-



In spite of its compact size the 1934 A.C. Century Super is quite simple to build—as will be seen from next week's layout and wiring guides, which will take the form of half-scale blueprints for both the top and under-side of the chassis and the mains unit



All the "odd bits" are hidden out of sight underneath the chassis, thus making the set particularly neat when finished

cause they are new, but because they do give us definite improvements over all other existing types. We could have put in four or five new types, but we refused to be stamped into such a course—we knew that some of these valve ideas were not yet proven.

Special Oscillator Circuit

Then, of course, you should study the cathode injection oscillator circuit, which foremost designers have agreed is undoubtedly the most satisfactory system for super-hets. This, coupled with the tuned band-pass input and intermediate-frequency coils designed to give 9-kilocycle separation, provides a combination of technical features that go to make up the really outstanding performance of this already famous set.

ALL THE PARTS YOU WILL NEED FOR THE 1934 A.C. CENTURY SUPER

CHASSIS

1—Peto-Scott Metaplex, 12 in. by 9½ in. by 4 in.

CHOKE, HIGH-FREQUENCY

1—Wearite, type HFS (or Bulgin, Goltone).

COILS

1—Wearite band-pass unit, type GN2.
1—Wearite oscillator, type O2.

CONDENSERS, FIXED

- 3—Graham Farish .0001-microfarad (or Dubilier, Lissen).
- 2—Graham Farish .0005-mfd. (or Dubilier Lissen).
- 1—Graham Farish .01-microfarad (or Dubilier, Lissen).
- 2—T.C.C. .1-microfarad, type 50 (or Dubilier, Lissen).
- 1—T.C.C. .25-mfd., type 50 (or Dubilier, Lissen).
- 5—T.C.C. 1-microfarad, type 50 (or Dubilier, Lissen).
- 1—T.C.C. 2-microfarad, type 50 (or Dubilier, Lissen).
- 1—T.C.C. 2-microfarad, type .501 electrolytic (or Dubilier).

CONDENSERS, VARIABLE

- 1—British Radiophone two-gang .0005-microfarad, type 138A.
- 1—J.B. .0005-microfarad, type Nugang A1.

HOLDERS, VALVE

- 3—W.B. four-pin, type Midget (or Lissen, Telsen).
- 5—Six five-pin, chassis mounting type.
- 1—Six, seven-pin, chassis mounting type.

RESISTANCES, FIXED

- 1—Graham Farish 300-ohm (or Dubilier, Telsen).
- 2—Graham Farish 600-ohm (or Dubilier, Telsen).
- 1—Graham Farish 750-ohm (or Dubilier, Telsen).
- 1—Graham Farish 10,000-ohm (or Dubilier, Telsen).

- 1—Graham Farish 15,000-ohm (or Dubilier, Telsen).
- 2—Graham Farish 20,000-ohm (or Dubilier, Telsen).
- 3—Graham Farish 30,000-ohm (or Dubilier, Telsen).
- 1—Graham Farish .5-megohm (or Dubilier, Telsen).
- 3—Graham Farish 1-megohm (or Dubilier, Telsen).

RESISTANCE, VARIABLE

1—Igranic .5-megohm, type Megostat.

SUNDRIES

- 3—British Radiogram 2¼-in. metal mounting brackets.
- 2—Sovereign terminal blocks.
- 1—Lissen terminal block.
- 4 ft. screened sleeving.
- Connecting wire and sleeving.
- 1—J.B. escutcheon.
- 5 yd. thin flex.

SWITCH

1—Bulgin rotary on-off, type S91.

TERMINALS

1—Belling-Lee, type M, marked: Aerial, Earth, Pick-up (two).

TRANSFORMERS, INTERMEDIATE-FREQUENCY

3—Wearite, type OTL.

TRANSFORMER, LOW-FREQUENCY

1—Lissen, type Hypermik.

MAINS UNIT

BASEBOARD

1—Peto Scott, 10 in. by 7 in.

CHOKE, SMOOTHING

1—Bulgin, type LF14

CONDENSERS, FIXED

1—Dubilier 4-microfarad electrolytic.

1—Dubilier 8-microfarad electrolytic.

HOLDER, FUSE

1—Bulgin twin, type F14 complete with fuses.

HOLDER, VALVE

1—W.B. four-pin, type Midget.

SUNDRIES

2—British Radiogram condenser mounting brackets

TRANSFORMER, MAINS

1—Heavyberd, type 717 with following windings: 250-0-250 volts—0.0 milliampere. 2-0-2 volts—1 ampere. 2-0-2 volts—6 ampere.

ACCESSORIES

CABINET

1—Dallow, type Radiogram.

GRAMOPHONE MOTOR

1—B.T.H., type YL Truspeed.

LOUD-SPEAKER

1—W.B., type PM4 or (Blue Spot, Celestion).

NEEDLE CUPS

1—Bulgin, type Duplex.

PICK-UP

1—Cosmocord, type. Universe Super with volume control.

SWITCH

1—Bulgin, type S91.

SUITABLE VALVES

M.V.S.	First Detector	Oscillator	Intermediate-frequency Amplifier (two)	Second Detector (metallised)	Power (triode)	Rectifier
Cossor	7IS Pen	41MHL*	MVSG	DDT	HMP*	508BU*
Lissen	—	ACHL	ACSGV	—	ACP	UU41
Marconi	—	MH4	VMS4	MHD4	—	U10
Mazda	—	ACHL	ACSG/VM	ACHL/DD	ACP	UU2
Mullard	SP4*	354V	MM4V*	TDD4*	—	DW2
Osram	—	MHL	VMS4	MHD4	—	U10
Triotron	S435N	A440N	S415N	—	E430N	G-170
Tungsram	HP4100	AR4101	AS4105	—	—	PV495

* Indicates valves used during "A.W." tests

Safety Battery Connections

HOW many amateurs are there who have not, at some time or other, gazed with feelings of bitterness and regret at a set of valves which, although as new in appearance, are absolutely useless, as a result of an accident taking place in a fraction of a second?

This risk of burning out valves is one which the amateur has always to take when trying a fresh scheme of connections or testing a new set. It is very easy to burn money in this way.

This risk of an accidental valve burn-out can, however, be considerably minimised in one or two ways. The most generally recommended precaution, of course, is a flashlamp

bulb in the least. It is the relative current consumption of valves and bulb that determines which shall burn out first.

To secure real protection for the valves, the bulb should be chosen so that its fusing current is only a fraction of the filament-current consumption. Fortunately, fuses are now obtainable which will "blow" at currents as small as 5 or 10 milliamperes. In general, it will be found that a fuse "blowing" at 60 milliamperes is most suitable.

Apart from the use of fuses, however, a little rearrangement of the battery connections will do much to lessen the risk of a chance burn-out. At one time it was the usual practice to connect filament circuits as in Fig. 2.

Here, low-tension positive is joined to high-tension negative, and low-tension negative goes to earth. It will be seen that an accidental contact between high-tension positive and the extensive earthed circuit of the set causes the burning out of the valves. The only advantage in the scheme seems to be that the filament voltage is added to that of the high-tension battery. With the high high-tension and low filament voltage of the modern set, this advantage disappears.

An arrangement in general use nowadays is that shown in Fig. 1, which shows, in skeleton form, a circuit employing a screen-grid valve of a type very popular at the present time. It will be seen that grid-bias positive, low-tension negative, and high-tension negative are common and earthed. At first sight, this seems an ideal arrangement.

When the switch in the common battery lead is open, high-tension negative is apparently completely isolated from the set, so that one can carry out internal adjustments to the set with complete safety. Quite a lot of valves have been burnt out in sets wired like this, by people who have acted on this belief. The fact is that an accident which merely short-

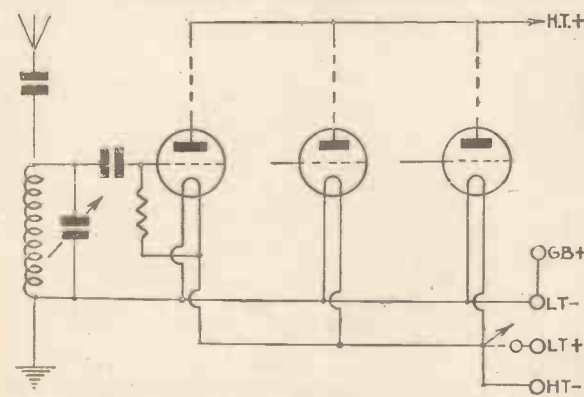


Fig. 2.—Old method of connecting filament circuits

bulb fuse placed in one of the high-tension leads, usually the negative. As a means of preventing a heavy discharge from the high-tension battery, when a short-circuit takes place through conductors of low resistance, this is quite effective.

Referring to Fig. 1, a short circuit such as this would occur if high-tension positive came into contact with the common battery lead for high-tension negative and low-tension negative, marked X, or with the tuning circuit connected to it. In the case of an accidental contact with the grid side of the tuning condenser, the coil would be burnt out, if not badly damaged, by the resultant heavy current which would pass through it.

In either of these cases, however, a flashlamp bulb, connected in the high-tension negative lead as shown, would immediately burn out and break connection with the high-tension battery, before any damage could be done, either to the battery or the coil.

Via the Valve Filaments

When a high-tension short-circuit takes place via the valve filaments, as would happen if high-tension positive came into contact with low-tension positive (Fig. 1), the flashlamp bulb is not to be relied upon to save an expensive accident.

An ordinary flashlamp bulb passes about .3 ampere under normal conditions, but it will stand a considerable amount of over-running, and it is possible for the filament to pass well over .5 ampere before giving out. This means that with a three-valve set, where the valves consume about .35 ampere, the valves are likely to be damaged, if not burnt out, before the bulb goes. With only one or two valves, that result is inevitable.

The valves may be rated at 6 volts, the bulb at 2.5 volts, but this does not really concern

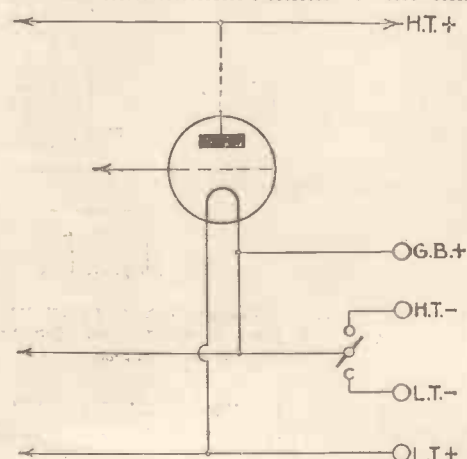


Fig. 4.—Completely isolating the high-tension battery

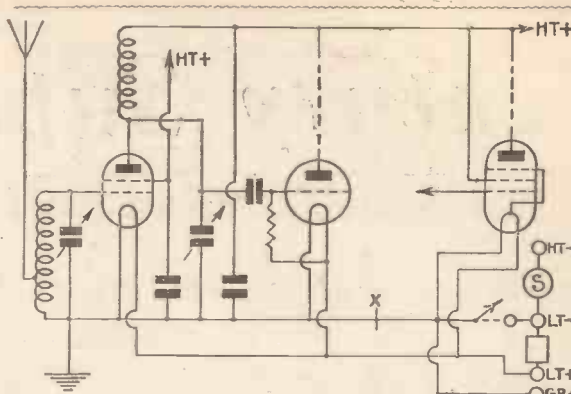


Fig. 1.—Circuit with fuse bulb inserted at the point marked X

circuits the high-tension battery when the set is switched on will burn out the valves when it is "off."

The flicking on to the earthed screening of a pentode or screen-grid valve lead, the breakdown of a by-pass condenser, and in certain cases the "shorting" of an anode-tuning condenser, will all have this effect, if the set is switched off.

Grave Disadvantages

The reason for this is not apparent until one remembers that high-tension negative, although not connected directly to the set, is still connected to low-tension negative and thence through the accumulator to the positive side of the filament circuit; in other words, high-tension negative is now connected to earth via the valve filaments. The fact that screen-grid sets are such prolific producers of high-tension short-circuits renders this a grave disadvantage.

It is possible to arrange matters so as to obviate this risk without making extensive alterations to the set. The simplest course to adopt is to remove the high-tension negative lead from the accumulator side of the switch and to place it on the "set" side, as shown in Fig. 3.

This alteration can be carried out in a few moments, and will ensure that contact between

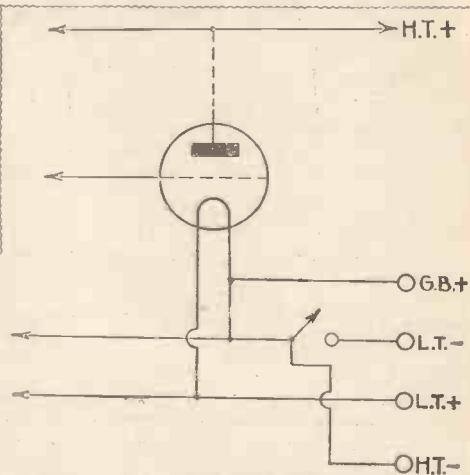


Fig. 3.—High-tension negative connected to "set" side of switch

high-tension positive and earth will in any case only short-circuit the high-tension battery. A fuse bulb of any kind, as mentioned earlier, will prevent damage due to the battery.

A method which does completely isolate high-tension negative, when the set is switched off, is shown in Fig. 4. It will be seen that instead of an ordinary filament switch, a wave-change switch is employed. In the type of switch referred to, two independent contacts

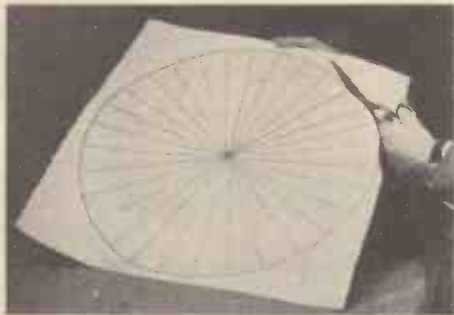
Continued on page 272

AMATEUR TELEVISION

Making Your Own Scanning Disc

Here are Instructions for Laying Out and Punching a 16-in. Scanning Disc

MANY readers who are taking up television are naturally desirous of constructing as much of the apparatus as possible and the scanning disc is one of the units which many think comes within their ability to make. So far as the mechanical operations are concerned a scanning disc is quite easy to make, the only tools necessary being a pair of large scissors, a trammel and a punch; both the last two items can be home-made.



The disc can be cut out with a pair of scissors

It must be pointed out though, that if the disc is to be effective it must be very accurately made, for quite small errors in the positioning of the holes will result in a marked and distorted picture.

The effect that errors will have will be clear from a little consideration of Figs. 1 and 2. Fig. 1 shows the arrangement of the holes in the disc and Fig. 2 shows how the picture is built up from the series of holes as the disc is revolved. Now it will be evident that any error in the positions of the holes will either show as a black line or distortion will result, due to two or more holes passing over the same area.

Obviously, the positions of succeeding holes must be exactly adjacent and when it is realised that the size of the holes is only .022 in., it will be appreciated that the setting out of the disc must be done with the greatest care.

Various considerations have proved that the most convenient size for the disc is 16 in. in diameter. Among other matters this makes for a reasonably compact machine and, what is of more importance, it needs less power to drive than the larger sizes so that there is less likelihood of the motor being just short of the power necessary to drive it at the correct speed of 750 revolutions per minute.

The best material for the disc is sheet aluminium and the most suitable thickness No. 28 gauge. This may appear rather flimsy, but it will be found that when revolving the disc straightens out and keeps almost perfectly flat. Heavier material is more difficult to cut and punch and unless it is perfectly flat in the first place it will not flatten out when running; also, more power is required to drive it.

Exact measurements for the size and location

of the holes are given and it must be understood that these are only applicable to a 16-in. disc; larger sizes would entail larger holes and slightly different spacing. The first requisite is a sheet of aluminium 17 in. square. Diagonal lines drawn across this will locate the centre so that the 16-in. circle can be scribed. For this we can use a wooden trammel or beam compass.

Do not, however, use a screw for the centre pivot for the probability is that the threads on the screw would result in error; a gramophone needle driven through the beam and the metal and into a board on which the metal is resting is as good as anything. A gramophone needle placed 8 in. from the pivot can also be used as a scribing point.

With the circle scribed the next task is the division of this into thirty equal parts. One way of doing this is to step the radius round so that the circle is divided into six parts; the trammel can be used for this. The six parts can then be divided into five by trial and error, which will give the thirty divisions. Another way of dividing the circle up is to use a protractor which must be fairly large if the divisions are to be accurate. Once the divisions have been found, lines should be lightly scribed diametrically across when if all is in order it will be found that these pass exactly through the centre of the circle. Should any inaccuracy be noted in this respect it should be corrected, otherwise the holes will be in the wrong positions.

We now require to indicate the positions of the holes radially and to do this it is necessary to scribe thirty concentric circles .022 in. distance apart. This distance, of course, is the same as the size of the holes and the lines will pass the sides of the holes when these are punched (see Fig. 4).

This completes the marking out and there remains the punching and the cutting out of the disc. The holes are .022 in. square and a punch will be necessary to make them. A piece of

1/4-in. tool steel should be obtained and filed down as shown by Fig. 3, the end being made quite square and finally finished off on an oilstone.

The actual punching is done by supporting the disc on a block of hard wood, using the end grain. If the punch is sharp, a smart tap with a light hammer will enable the metal to be cut cleanly through. Before attempting work on the actual disc a few tests should be made on some scrap pieces of metal in order to test the punch.

Points to observe are that the edges of the punch are square and sharp, the wood is hard

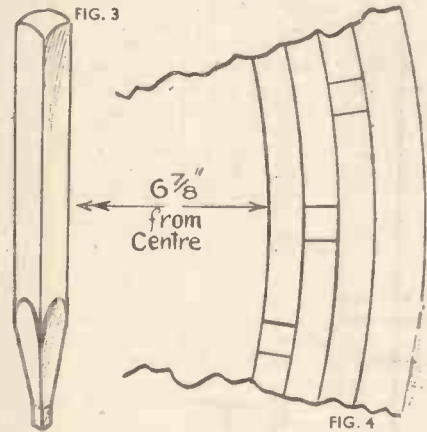


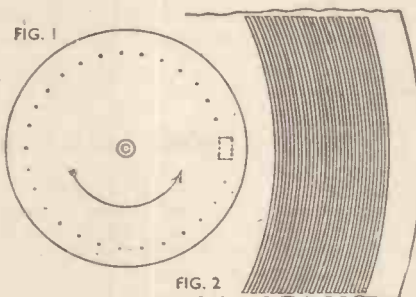
Fig. 3.—A punch of this type should be made for punching the holes. Fig. 4.—Diagram showing the relative positions of the holes

and close-grained, and that the metal is moved to a fresh place on the wood as each hole is made.

There now remains the cutting of the centre hole for the boss and the mounting of the latter. A circle of the size of the boss should first be scribed and the hole enlarged until it is nearly the size of the scribed circle, when the remaining metal can be removed with a round file. The disc should now be mounted and tested for true running. Slight inaccuracy in this respect can be remedied by allowing a certain amount of clearance in the centre and mounting holes and adjusting the disc before finally tightening up.

Finally, the disc should be tested for scanning. Broad white lines denote that adjacent holes are overlapping in the scanning and black lines that the holes are too far apart. A certain amount of correction is possible by the careful use of a light hammer and small file and it will be found that this can be accomplished more easily before any burrs are removed.

The disc can either be left plain or be spoked by cutting metal away. Eight spokes will give a stroboscopic effect and appear stationary when viewed by the light of a lamp operated from 50-cycle A.C. mains and running at the correct speed.



Figs. 1 and 2.—Diagrams showing the arrangement of the holes in the disc and how the picture area is scanned

A COMPLETE DISC RECEIVER, IDEAL FOR THE BEGINNER, IS DESCRIBED IN "TELEVISION" FOR MARCH



All over the country pylons carrying high-voltage mains are springing up. The question of mains interference is daily becoming of greater importance

Tex photo

WE have all seen or heard of police court summonses about someone "committing a nuisance." But what about people who commit nuisances—nowadays unnecessary and avoidable nuisances—in the wireless ether? As things are at present they are beyond the law, but signs are not wanting that a brighter era is on the way.

This, at least, was one's impression at a recent discussion at the Institution of Electrical Engineers on "The Interference of Electrical Plant with the Reception of Radio Broadcasting."

Increasing Interference

The subject, of course, is not a new one. The Assistant Chief Engineer of the B.B.C. mentioned recently that they had been dealing with complaints for eight years. But the increasing sensitivity of wireless sets, the increasing use of mains sets, and the increasing use of electrical appliances in industry and in the home are all making the trouble more acute.

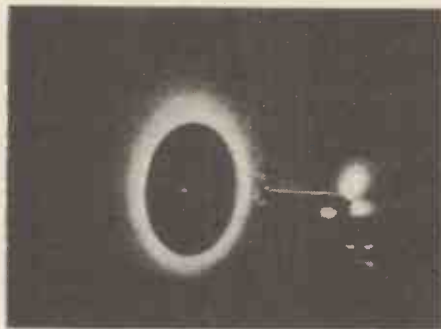
Fortunately, means of combating the trouble are now equally well known, and practically every kind of electrical apparatus can be silenced—either completely or practically so—except, perhaps, high-frequency medical apparatus.

And fortunately, also, the cures are mostly not expensive, so that the hardship of legal compulsion in their application would not be great, nothing like so great as the hardship to millions of wireless listeners, whose programmes are spoilt by noises from the mains.

A recent I.E.E. discussion was all in the

direction of legislation. Most other countries already have it, so why shouldn't we? Mr. Morris, the Post Office investigating engineer, who opened the discussion, gave interesting figures on interference levels (signal/noise ratio) which might form the basis of legislation. He also gave liberal details of the suppression methods which the Post Office has found effective in its technical investigation of mains interference.

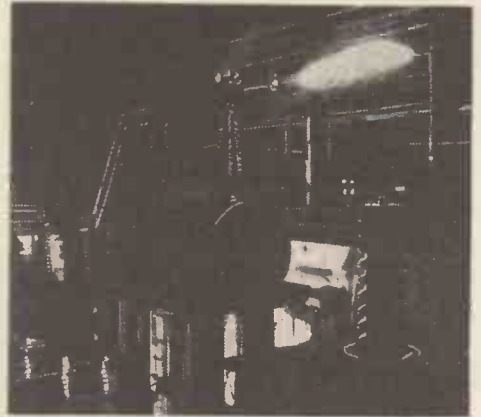
Better still, he gave a visual and aural demonstration (the same as was shown at the Radio Exhibition) of the noise which various motor-driven devices produce in a radio receiver. Best of all, he followed this by its natural sequel of demonstrating how they



Any receiver used in the vicinity of any discharge such as this would—well, produce sparks!

regarded as abusers and intruders.

For the benefit of readers who may ever be concerned with applying suppression devices to noisy electrical machinery, an outline of the methods which the Post Office investigators have found to be most effective is given opposite.



Another high-voltage discharge staged at the Ferranti works, where all sorts of power tests are carried out

This covers most types of offensive devices, the only outstanding offender being high-frequency electro-medical apparatus.

For this type of apparatus the only effective cure is complete electrical screening of apparatus, patient and all.



Tracking Down Those Annoying Crackles!

WHY do listeners put up with so much background noise during wireless reception? Especially in towns, as often as not we find broadcast programme enjoyment marred by sundry crackles and noises setting up a continuous background. Very often listeners seem to imagine that these noises are all part of the game, that their sets are to blame, or that outside offenders cannot be brought to book.

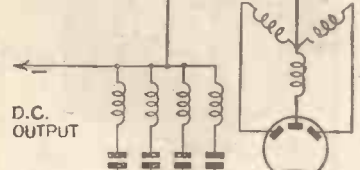
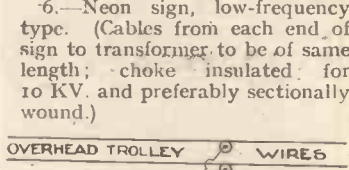
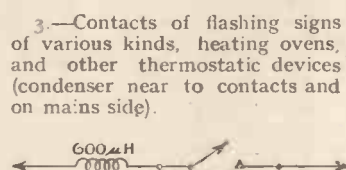
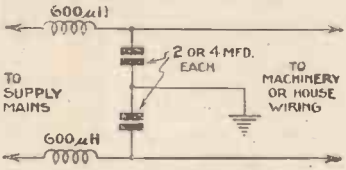
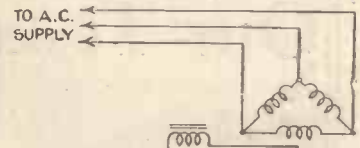
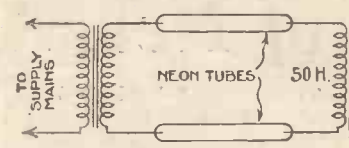
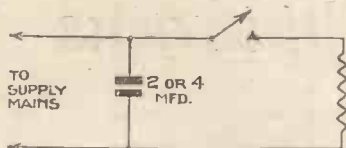
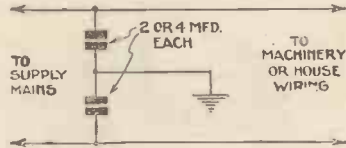
In actual fact, though, most of the troublesome noises of reception can be greatly reduced in strength, if not entirely eliminated. Perhaps the first thing to do is to determine whether such noises are really caused by some external source. To do this is not always so simple, but there are one or two easy tests that may help.

For example, if the crackles stop when the aerial lead is removed, or when the earth is removed, or when both these externals are disconnected, you are almost certainly suffering from external interference. If this is always with you, there must be some local machine setting up the disturbance.

Should you feel quite sure that the trouble is not of your own making the next thing is to go to your nearest head post office and ask for the special form now available to all broadcast listeners. When you have filled in this form and sent it up to the post office, you will be well on the way to satisfaction, for within a short time post office engineers will be along to investigate the trouble at its source.



TEN WAYS OF MINIMISING MAINS INTERFERENCE



1 and 1a.—Applied at source of disturbance to noisy motors and generators, D.C. or A.C.; satisfactory also for most types of lifts and for vibrating-rect rectifiers.

3.—Contacts of flashing signs of various kinds, heating ovens, and other thermostatic devices (condenser near to contacts and on mains side).

6.—Neon sign, low-frequency type. (Cables from each end of sign to transformer to be of same length; choke insulated for 10 KV. and preferably sectionally wound.)

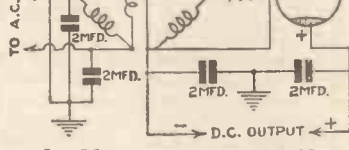
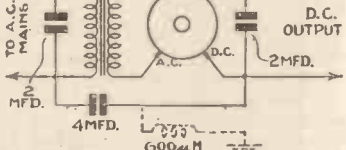
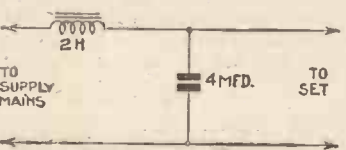
9.—Mercury-arc rectifiers, low-frequency interference (audio-frequency filter circuits).

Applied also at consumers' premises for general suppression of high-frequency disturbance entering via mains (but does not protect against radiation from neighbouring premises or direct vibration from source of noise).

4.—Flashing sign contacts, electric tramways, and lift-controllers. (Choke not always essential; if used, must be placed before contacts.)

7.—Tramway and trolley-bus systems (but this is "up to" the owning authority).

10.—Car ignition systems—suppressor resistances in plug leads, screened wiring and preferably screened magneto.



2—Useful, in addition to circuits above, in mains supply to D.C. receivers working on mains supplied by mercury-arc rectifiers.

5.—Rectifiers of commutator type: garage, service stations, etc. (Chokes required when earthing is necessary.)

8.—Mercury arc rectifiers, high-frequency interference. (Has been found very satisfactory with small low-tension rectifiers, such as cinema equipment.)

10.—Car ignition systems—suppressor resistances in plug leads, screened wiring and preferably screened magneto.

Listeners' Letters

CONSOLELECTRIC RESULTS

To the Editor, AMATEUR WIRELESS
 SOME weeks ago I built the Consolelectric Two and am delighted with the set's performance—the quality, volume, and station getting powers are very good. Congratulations.
 Daylight reception is uncanny for a two-valver.

H. EDDISON FOX.
 1032
 Gloucester.

CHEAP HIGH TENSION

THE correspondence in your paper re cheap high-tension batteries interests me greatly inasmuch that I have used nothing else for this past two years and have never been let down during that period.
 I am using a three-valve screen-grid set with a consumption of 12 milliamperes and my set is in use for over five hours a day.
 These "dollar" batteries generally last between three and a half to five months, and I certainly think that the majority of your correspondents have been very unlucky in their choice of batteries as I have tried 115 batteries that have not lasted as long.

T. EDWARDS.
 1033
 Liverpool.

MELODY RANGER IN JAVA

YOUR October 7, 1933, issue contains a letter from J. B. Brown, of Congo Belge, to the effect that he worked his Melody Ranger with three standard unit torch cells in parallel and obtained results.

He does not say what type of valves he used, but supposing he used Mullards (as were specified) the low-tension current drain under normal conditions would be: PM12V, 15

ampere; two PM2DX's, .2 ampere; PM252, .4 ampere a total of .75 ampere. Therefore, the joint resistance of the four valve filaments in parallel is roughly 2.6 ohms and the power used is 1.5 watts.

Now assuming Mr. Brown's dry cells are giving their maximum voltage, 1.5 volts, the maximum current he can get is .56 ampere, and the power developed is .84 watt. This is not taking any lost volts into consideration. However, as he has three cells in parallel lost volts would not be so very high, even with old cells.

On the face of the above facts I fail to see how his valve filaments will be heated sufficiently to give the necessary emission, and I would be very grateful to anyone who can give me an explanation of this phenomena.

I have a Melody Ranger, and have tried using three dry cells (new) in parallel as my filament battery, but without the slightest success. While on the subject I should like to express my appreciation of the Melody Ranger, which I have found gives excellent results down to 30 metres.

On medium waves I have had, I think, some really exceptional results, which include KNX Hollywood, California, and KSL, Salt Lake City, Utah; both of these stations are over 9,000 miles away, and the latter is east of the Rockies. Both stations were played on the loud-speaker.

I also receive several stations over 1,000 metres, but so far have not been able to identify any of them. One of them speaks French sometimes and at other times a foreign language which I think is Russian.

J. B. L. HENDERSON.
 1034
 Banjoewangi, East Java.

Readers' Views on This and That

"AIR CELLS"

WITH reference to the notes by Thermion in your issue of February 24, concerning the use of air cells for valve heating I have to inform you that Thermion appears to be misinformed on this subject.

This type of cell has been made in this country for a long time now under the name of A.D. (Air Depolarising) cells; both wet and dry are extensively used by the Post Office and railways.

The writer has used A.D. cells for valve heating with great success on multi-valve sets for the past ten years.

A.D. cells can be procured from the manufacturers: Le Carbone, Ltd., Spencer House, South Place, London, E.C.2.

F. O. LONG.
 1035
 Hove, Sussex.

AMERICAN RECEPTION

THE recent articles and letters in AMATEUR WIRELESS on the subject of American reception on the medium waves have been of considerable interest to me as a few weeks ago I achieved considerable success in this direction.

One station (which must be WTAM) came over week after week.

On Thursday morning, February 15, from 12.15 a.m. to 12.45 a.m., reception was really wonderful when I picked up WTAM.

Stations literally came pouring in and WBZee announced itself at comfortable loud-speaker strength.

KMOX came in slightly below WTAM and, going still lower I heard WCAU.

F. G. FORD.
 1036
 London, N.21.

Conducted by J. H. Reyner, B.Sc., A.M.I.E.E.

Our Tests of New Apparatus



Trantex high-tension unit

TRANTEX HIGH-TENSION UNIT

THE Trantex high-tension unit can be used off any A.C. voltage between 100 and 250 without the usual input tapping arrangement. It is supplied in a metal case with a sprayed enamel finish and incorporates a Westinghouse metal rectifier and all the usual components associated with it. The unit is very compact in size, the overall dimensions being 5½ in. wide, 7½ in. long and 3½ in. deep.

Four plugs are provided for connecting purposes, these being H.T. —, H.T. + screen grid, H.T. + detector and H.T. + maximum. No variable tappings are provided.

Test Results.—The unit was tested on an input A.C. voltage of 250; the manufacturer's ratings for this are 150 volts at 20 milliamperes and 125 volts at 25 milliamperes. The measured voltages were as follows:

	HT	HT	HT
	±	+	+
	S.G.	Det.	Max
No load	110	192.5	215
20 milliamperes load on max.	65	100	145
1 milliamperes load on detector			
.65 milliamperes load on S.G.			
25 milliamperes load on max.	55	90	125
.9 milliamperes load on detector			
.55 milliamperes load on S.G.			

From these figures it will be seen that the actual measured voltages compare favourably with those quoted by the manufacturer and no trace of hum was observed with this unit in use on a receiving set.

The unit is guaranteed for three years from the date of purchase.

Makers: Norman Tranter. Price, £1 17s. 6d.



Loewe fixed condensers

STACKPOLE VOLUME CONTROL

THE Stackpole volume control is intended for use in circuits requiring an ultra-high-resistance potentiometer, the ranges available being from 75,000 ohms to 1 megohm. In all there are seven different sizes.

The resistance element is composed of a thick moulded circular ring having an extremely hard surface, which in conjunction with a nickel-chrome contact disc rotating on a steel point gives a definite contact point.

Strong stop pins are also fitted, which serve also to hold the resistance element and at the same time hold the two outer contact tags. Soldering tags are

provided for connecting purposes and the one-hole fitting is of the standard 3/8 in. type.

A dust cover is fitted to the control and a bakelite control knob is supplied. The overall dimensions are 1½ in. diameter by ½ in. deep.

Test Results.—A 500,000-ohm sample was submitted for test purposes. This was found to have an actual value of 480,000 ohms, the margin of error being well within working limits.

The contact was found to be reasonably quiet in operation and the resistance element gave a graded distribution over the length of its travel.

Distributors: Claude Lyons, Ltd. Price, 6s. 6d.



Stackpole variable resistance

LOEWE FIXED RESISTANCES

RECENT additions to the Loewe range of components are a number of paper-dielectric fixed condensers in moulded bakelite cases.

These condensers are neatly made with moulded lugs provided for fixing purposes, and both screw terminals and soldering tags are fitted for the connections. The condensers are filled with paraffin wax and sealed under a vacuum with pitch, eliminating as far as possible the adverse influences of moisture and air.

The cases are finished in brown bakelite.

Test Results.—Two samples were tested and the actual capacities were found to be within the rated tolerance of plus or minus 10 per cent.

Rated capacity	Actual capacity
4 microfarad	4.1 microfarad
1 microfarad	1.1 microfarad

No signs of leakage were observed when the condensers were tested on a 500-volt supply, and they should prove satisfactory in use.

Makers: Loewe Radio Co., Ltd. Price, 4 microfarad, 4s., 2 microfarad, 2s. 6d., 1 microfarad, 2s.

Test Methods

Large Condensers

CHECKING the capacity of large condensers of the order of 1 and 2 microfarads can be done by various methods. One is to charge the condenser up and then discharge it through a special form of galvanometer known as a Ballistic galvo.

This is a relatively slow-moving instrument and the sudden rush of current starts the needle moving; it proceeds to climb laboriously up to a certain point on the scale and then falls back. This process is rather like a "try your strength" machine and the capacity is estimated from the extent of the movement of the pointer.

An alternative method, which is perhaps more satisfactory for radio condensers, is to apply an alternating voltage across the condenser and to note the alternating current through it. This method can be made to give results comparable with those obtained in actual practice, particularly if the value of the A.C. voltage applied is of the same order as the ripple which the condenser will have to smooth.

The simplest method is to pass a known alternating current through the condenser and to measure the voltage actually across the condenser with a valve voltmeter.

What's New in Radio?

THOSE who are looking for something unusual in the way of loud-speaker cabinets should send for details of a new model produced by the Dallow Manufacturing Co., Ltd., of Forge Mill, Milford, Derbyshire. The cabinet is mounted on chromium-plated pillars and incorporates a special form of suspension that is claimed to be entirely free from vibration.

The Ferranti A.C.-D.C. circuit tester is a compact and neat little job. It has twenty-two ranges; D.C. and A.C. volts, milliamperes and ohms. The voltmeter ranges have a resistance of 1,000 ohms per volt.

There are five sockets on the top of the case into which are inserted the plugs attached to the leads provided. For the 600-volt range, an external resistance box is provided. The price of the meter complete with accessories in a leatherette-

finished case is £5 15s. This is an instrument that will be of the greatest value to every experimenter.

A new Westector has been introduced. It is the WX6 and can be used as a detector in straight and super-het circuits, and also for providing self-adjusting volume control from a normal valve detector. This new Westector is suitable for frequencies up to 1,500 kilocycles, whereas the original W types were only suitable for frequencies up to 200 kilocycles. The WX6 is the same in size as the type W6 and the price is 7s. 6d.

The new Ultra 22, mentioned in this feature last week, is now available for 25-cycle mains, at the price of £13 2s. 6d.

Several firms announce that they are manufacturing universal valves. The Micromesh range will be available in about six weeks, but it is not yet known what types they will be. Triotron have added a half-



Ferranti A.C./D.C. circuit tester

wave rectifier to their range. This valve is rated to give 70 milliamperes at 250 volts. The heater current is .18 ampere at 30 volts. The type number is G3070 and the price 10s. 6d.

Ferranti are introducing a range of four valves. These will be a heptode, high-frequency pentode, double-diode pentode and half-wave rectifier.

FOR EVERY SET — there's a PILOT AUTHOR KIT CASH — C.O.D. — or H.P.

IMPORTANT Miscellaneous Components, Parts, Kits, Finished Receivers or Accessories for Cash, C.O.D. or H.P. on our own system of Easy Payments. Send us a list of your wants. We will quote you by return. C.O.D. orders value over 10/- sent carriage and post charges paid (GREAT BRITAIN ONLY.) OVERSEAS CUSTOMERS CAN SEND TO US WITH CONFIDENCE. We carry a special export staff and save all delay. We pay half carriage — packed free. Send full value plus sufficient for half carriage. Any surplus refunded immediately. Hire Purchase Terms NOT available to Irish or Overseas customers.

LUCERNE RANGER

ANY ITEM SUPPLIED SEPARATELY

	£	s.	d.
1 Metallised baseboard, 14 by 10	1	3	0
2 H.F. choke kits as in "A.W." February 3	3	0	0
2 Lucerne coils as "A.W." January 27	5	0	0
2 .0002-mfd condensers, type 665	1	0	0
1 .0003-mfd condenser, type 665	1	6	0
2 1-mfd condensers	4	0	0
1 2-mfd condenser	2	6	0
2 .0005 mfd. variable condensers, air dielectric	6	0	0
1 .0005 mfd. Reaction condenser	2	0	0
3 4-pin valve holders	1	11	0
5 Wander plugs	7	1	0
2 Spade terminals	4	0	0
2 Terminal blocks (with terminals)	1	0	0
1 Resistance 25,000 ohms	7	1	0
1 Resistance 1 meg. grid leak	7	1	0
1 Wood panel, 14 by 7 (plain)	1	6	0
2 3-inch dials	1	0	0
2 3-point push pull switches	1	9	0
1 Transformer kit as "A.W." dated February 10	3	6	0
Aluminium for screen, 10 by 6 in.: brass strip for bracket (6 by 1/2 inch): 6 bolts & terminals	2	3	0
Wire screws flex etc.	2	3	0
KIT "A" CASH or C.O.D. Carriage Paid	£19	0	0

KIT "A" 39/-
CASH OR C.O.D.
Carriage Paid

KIT "A" Comprises the Kit of Parts as detailed, less Valves, Cabinet and Speaker. Cash or C.O.D. Carriage Paid, £1/19/0.

Balance in 11 m'thly payments of 3/6. **ONLY**

KIT "B" As for Kit "A" but with valves only. Cash or C.O.D. Carriage Paid, £3/10/3.

Send only **6/6**

Balance in 11 monthly payments of 6/6

KIT "C" As for Kit "A" but with valves & Peto-Scott Lucerne Cabinet. Complete with B.A. Cone speaker. Cash or C.O.D. Carriage Paid, £4/12/9.

Send only **8/6**

Balance in 11 monthly payments of 8/6

ASSEMBLED LUCERNE PARTS

★ IF Ready-assembled Lucerne coils, H.F. choke, and L.F. Transformer required with kit in place of parts for same as detailed in list of parts, add 5/- to Cash or C.O.D. Prices, or 6d. to each monthly payment.

A.C. CENTURY SUPER

Described in this week's issue

KIT-BITS

You pay the Postage. We pay all post charges on orders over 10/- G.T. BRITAIN ONLY.

1 Peto-Scott METAPLEX Chassis	3	6
1 Wearite band-pass unit, type GN2	1	6
1 British Radiophone, type 458A, condenser	1	0
1 J.E. Nugang, type A1, condenser	10	6
3 Wearite, type OT1, intermediate transformers	2	6
1 Heyberd mains transformer, type 717	14	0
1 Peto-Scott 1934 walnut Adaptagram cabinet, Model "A"	3	0
1 Peto-Scott baffle baseboard assembly	3	6
1 B.T.H. Truesped motor, type YL	2	9

Author's Kit of First Specified parts, including METAPLEX Chassis, but less Mains Portion and Valves, Cabinet and Speaker. Cash or C.O.D. Carriage Paid, £9/0/0.

RECEIVER PORTION 16/6

and 11 monthly payments of 16/8.

Set of Valves for Receiver Portion, £4/15/6.

MAINS UNIT 5/6

Years for Author's Kit of Specified Parts, including Baseboard, but less Valve, Cabinet and Speaker. Cash or C.O.D. Carriage Paid, £3/0/0.

and 11 monthly payments of 5/6.

Valve for Mains Unit Portion, 12/6.

COMPLETE KIT 48/-


Comprising Receiver Portion and Mains Unit Portion, together with Valves, Less Cabinet and Speaker. Cash or C.O.D. Carriage Paid, £17/8/0.

and 11 monthly payments of 50/-.

If W.B. P.M.A. Speaker required, add £2/2/0 to Cash or C.O.D. Prices and 3/9 to each monthly payment.

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1934 WALNUT ADAPTAGRAM



YOURS FOR 8/3

38 in. high
22 in. deep
15 1/2 in. wide
Speaker
Compartment: 17 in. by 14 in.

CONVERT YOUR EXISTING SET INTO A MODERN RADIOGRAM


As illustrated. Cash **63/-** Carriage 2/6 extra. Or 8/3 Deposit and 11 monthly payments of 5/8 (Carriage Paid).

IN OAK OR MARGOGANY NO EXTRA.

Special drillings or other special cut-out designs add 3/- extra to cash price or 3d. to each monthly payment.

Direct from Factor. No MIDDLEMAN'S PROFITS. Built by master-craftsmen of the piano trade. Real inlaid walnut mortised, tenoned, French polished. With motor-board ready to take your set, speaker and power equipment. Plain front or vignetted panels, 14 in. by 7 in., 16 in. by 7 in., 18 in. by 8 in. Baffle-board, 3/6 extra.

PETO-SCOTT PERMANENT MAGNET MOVING-COIL SPEAKER



POWER AND PENTODE OUTPUT

Complete with input transformer. Send only 2/6; balance in 5 monthly payments of 4/-. Cash or C.O.D. Carriage Paid, 19/6.

2/6 DOWN

PETO-SCOTT CO. LTD. 77 City Road, London, E.C.1
Telephone: Clerkenwell 9406/7.
West End Showrooms; 62 High Holborn, London, W.C.2.
Telephone: Holborn 3248.

Dear Sirs,
Please send me CASH/C.O.D./H.P.
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ADDRESS.....
A.W. 10-2/34

TELSEN STRAIGHT BATTERY THREE

323 Complete Kit of Parts in Sealed Carton, less Valves, Cash or C.O.D. Carriage Paid 29/6 or yours for 5/- down and 5 monthly payments of 5/3.



As above but with Mazda Valves. Cash or C.O.D. Carriage Paid, £2/15/6, or 5/- down and 11 payments of 5/-.

YOURS FOR 5/-

As above, with Valves, but including PETO-SCOTT Compact Cabinet Illustrated and PETO-SCOTT B.A. Speaker. Cash or C.O.D. Carriage Paid £3/17/6, or yours for 7/6 and 11 monthly payments of 7/-.

If Peto-Scott Permanent-Magnet Moving-Coil Speaker required add 12/6 to Cash Price or 1/2 to each monthly payment.

B.T.H. MINOR PICK-UP AND TONE ARM. Cash or C.O.D. Carriage Paid £1/1/0. Balance in 4 monthly payments of 4/6.

GARRARD AUTOMATIC RECORD CHANGER for A.C. Mains. Mounted on Unit Plate complete, ready for fitting in position including Garrard Pick-up and Tone Arm. Cash Price, £10/0/0. Carriage Paid. Balance in 11 monthly payments of 18/6.

NEW GARRARD MODEL 202A. 12-in. Turntable. Electric motor for A.C. mains. Cash or C.O.D. Carriage Paid, £2/10/0. Balance in 3 monthly payments of 6/-.

TELEVISION DEPARTMENT IN FULL SWING

SEND FOR DETAILED LISTS EVERYTHING TELEVISION CASH — C.O.D. — H.P.

NEW LISSEN 7-VALVE SUPER-HET CHASSIS MODEL. complete with Lissen Valves in Sealed Carton. Cash or C.O.D. Carriage Paid £3/17/6. Balance in 11 monthly payments of 16/6.

NEW BLUE SPOT PERMANENT MAGNET MOVING-COIL SPEAKER 29 P.M. With Input Transformer. Cash or C.O.D. Carriage Paid £1/12/6. Balance in 6 monthly payments of 5/-.

NEW BLUE SPOT 99 P.M. PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with tapped Input Transformer. Cash or C.O.D. Carriage Paid £2/19/6. Balance in 10 monthly payments of 6/-.

NEW BLUE SPOT "CLASS B" OUTPUT STAGE. As advertised. Complete with Osram B21 "Class B" Valve. Cash or C.O.D. Carriage Paid 43/6. Balance in 14 monthly payments of 4/-.

CELESTION P.P.M. 19 PERMANENT MAGNET MOVING-COIL SPEAKER, with Standard or Pentode Transformer. Cash or C.O.D. Carriage Paid £2/7/6. Balance in 11 monthly payments of 4/3.

ROLA 6P.M. PERMANENT MAGNET MOVING-COIL SPEAKER, with Input Transformer. Cash or C.O.D. Carriage Paid £2/9/6. Balance in 8 monthly payments of 6/-.

BARGAIN PHILCO 5 VALVE BALANCED SUPER-HETERODYNE

LOWBOY CONSOLE MODEL 56.
All Electric; seven tuned circuits with single dial control. Gives amazing performance with new economy in operating costs. Duo wave-lengths; no leak between bands. Illuminated dial, no reaction; chassis and tuning condenser floating on rubber. Oversize, energised M.C. Speaker with large baffleboard gives exquisite, full tone. Beautiful cabinet in Walnut and Oriental woods with rich inlaid. Height, 39 1/2 in.

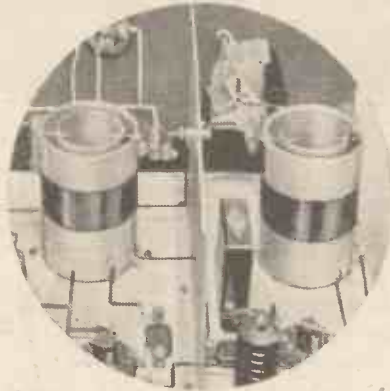
LIST PRICE 22 GNS. OUR PRICE 12 GNS.

Or 18 monthly payments of 16/6.

SEND DIRECT to AVOID DELAY — CASH, C.O.D. or EASIWAY

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

MAKE YOUR OWN COILS for the LUCERNE RANGER with OHMIC

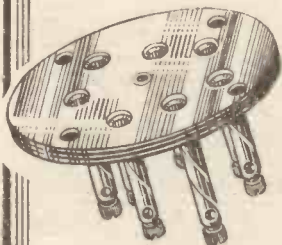


Lucerne Coils for the 39/- Lucerne Ranger, exactly to specifications, in kit form, include everything you need for the winding of the coils, as well as all the terminals and spacing pieces, together with full instructions. The price for each complete Coil, either for aerial tuning or inter-valve coupling Ready wound, assembled, and laboratory tested, per pair Post 6d. extra.

OHMIC ACCESSORIES

9 MYRON PLACE, LEWISHAM, LONDON, S.E.13
Phone: Lee Green 3491

CLIX Specified for the "A.C." CENTURY SUPER



CLIX first and still foremost

CLIX SPECIFIED Because

They were the first Chassis Mounting Type Valveholder produced and were far ahead of any other type for all round efficiency. They still retain that lead. They are super low-loss valveholders. They are the only chassis mounting type with terminals, and the only valveholders giving full surface contact with any type of valve-pin; this is obtained by the use of Clix patented resilient sockets.

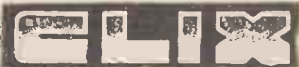
FLOATING MODEL

7-pin with terminals ... 1/-
without terminals ... 9d.

STANDARD MODEL

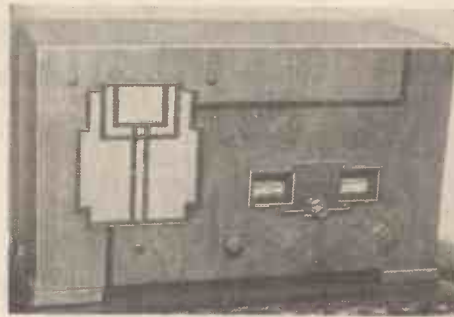
5-Pin with terminals ... 9d.
without terminals ... 6d.

Clix "1934" Folder "A" Free. It gives illustrations and details of over 30 perfect contact components.



LECTRO LINX LTD., 79a Rochester Row, London, S.W.1

Marconiphone Model 285



The new Marconiphone model 285 is housed in a most attractive cabinet.

ONE is rather inclined to belittle a battery receiver, and it is not until you come across such receivers as the Marconi 285 that you begin to realise that a battery set, if carefully designed and with adequate high tension, can give quality comparable with many mains-driven sets.

We were very impressed with the unusually elegant inlaid-walnut cabinet which is of the horizontal type—again rather a change from the usual trend of design.

A moving-coil loud-speaker of the permanent-magnet type is mounted behind the fret on the left-hand side of the cabinet, while the dual escutcheon contrasts very nicely in colour with the cabinet. The three knobs all match up with the escutcheon.

Simplicity in operation is always a desirable feature. With this set there are only three major controls and even these three are more than usually simple to use. On the left-hand side is the wave-change and gramophone switch, with the various positions clearly engraved on the knob.

On the right-hand side is the volume control. In operation this seems to be a normal reaction control, but this is far from being the case. This volume control is of the triple-action type and is distortionless on even the strongest signals. It successively adjusts the signal input, the voltage on the screen of the variable-mu screen-grid valve and the amount of reaction, so that amplification throughout is reduced or increased evenly.

The circuit consists of a variable-mu high-frequency stage, band-pass coupled to the aerial. This valve is then coupled to a triode detector, which is in turn transformer-coupled to two pentodes in a special Q.P.P. circuit. This circuit is a definite improvement on the conventional Q.P.P. arrangement, as it gives better quality, is decidedly more economical,

and at the same time will still give good quality when the output is reduced to 100 or 200 milliwatts. The moving-coil loud-speaker handles the output of 1,250 milliwatts with the greatest of ease. Provision has also been made for an external loud-speaker of either the high- or low-resistance type.

IN A NUTSHELL

Makers: Marconiphone, Ltd.

Model: 285.

Price: £11 17s. 6d. (with batteries).

Valves Specification: Variable-mu high-frequency stage (Marconi VS2); triode detector (Marconi HL2); and two pentodes in special QPP output circuit (Marconi PT2's).

Power Supply: Self-contained high-tension battery and low-tension accumulator.

Type: Self-contained horizontal table model.

Remarks: An outstandingly good quality receiver.

The current consumption is proportional to the strength of reception, so that the life of the high-tension battery is longer than usual. The "rest" or standing current is as low as 6 milliampères, but we found that a good average current is 9 or 10 milliampères. With the pick-up in circuit the anode current was approximately 8 milliampères.

A combined high-tension and grid-bias battery of 175 volts is fitted inside the cabinet, while the 60 ampere-hour accumulator is dropped in a slot so that it can be removed without taking the back off the set.

Alternative Aerial Connections

Three alternative aerial connections are provided to ensure maximum results under all conditions, while a trimming adjustment is provided so that the receiver can be adjusted to suit your particular aerial. It also enables the maximum efficiency to be obtained from the Ferrocart coils used.

On test, the most striking point is the quality. This is really splendid. In fact when the mains supply is noisy and causes nasty crackles and phizzes in the loud-speaker, this type of battery set is preferable to its mains-driven counterpart.

All of the more powerful Continental stations can be reliably tuned-in without trouble. That is very good when one considers that this is only a four-valve set.

Safety Battery Connections

Continued from page 266

are brought into common contact with a third, of which the spindle forms part.

Thus the spindle is connected to the valve filament circuit—this is done automatically when the switch is mounted on an earthed metal panel—and high-tension negative and low-tension negative go one to each of the insulated contacts. With the switch open, it is now quite safe to carry out internal adjustments to the set, as it is impossible either to short-circuit the high-tension supply or to burn out the valves.

It is possible to use an ordinary filament switch in this way, provided that it is not of the type in which one of the blades is in permanent metallic connection with the spindle and fixing bush. When a metal panel is not

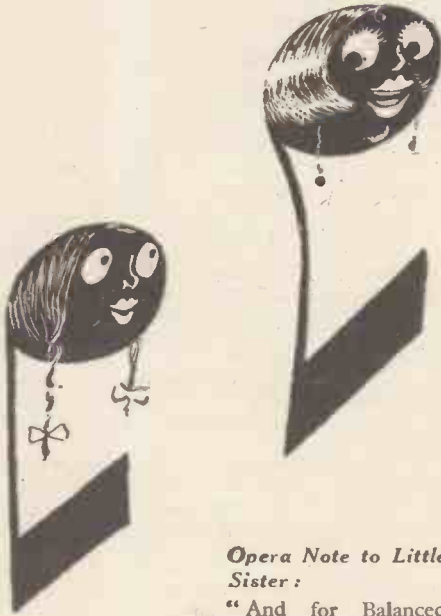
used, a connection from the valve filaments can quite easily be made to the fixing bush, the two blades, of course, being connected one to high-tension negative and the other to low-tension negative.

The foregoing remarks re the danger of high-tension short-circuits apply with equal force to cases where high-tension mains units are used. A mains unit, whilst not capable of giving a heavy discharge like a "dry" battery or accumulator, is liable to serious damage, involving probably the destruction of the rectifier when it is short-circuited.

A lot of people are under the impression that a mains unit will not burn out valves by reason of its high internal resistance. The reader is assured, however, that the stored current in the smoothing condensers will burn out valves just as quickly and neatly as the heaviest high-tension accumulator!

A. T. P.

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Starting on the Short Waves

By KENNETH JOWERS

ON an average I suppose at least two letters a week in my postbag come from fans wanting to know how they can start transmitting on the short waves. They invariably end up by imploring me to send them a suitable circuit.

Sorry, but I can't—really, I can't. Long before you can begin to think about circuits you must obtain a permit from the Postmaster-General—and that's the snag.

To get this permit you must first swot up the morse code, becoming proficient enough to send or receive 12 words per minute.

Then, even when you have passed this test, you must satisfy the P.M.G., that you have a definite experimental plan in view, and that your transmitting work will in some way further radio science.

Join the R.S.G.B.

Supposing that you do manage to reach this advanced state, I strongly advise you to join the Radio Society of Great Britain, of 55 Victoria Street, S.W. This organisation issues a bulletin once monthly of great value to the amateur transmitter.

The R.S.G.B. also publishes a booklet, telling you how to get started in the transmitting game, including a typical circuit.

Where I can help is on the receiving side. Many letters are written asking for ways and means of getting down to short-wave radio reception. For a start, there is no need to go to great expense. You can get lots of fun with a single-valve set and a pair of headphones.

For a suitable one-valver you need only a few good-class short-wave components, such as a .00017-microfarad Stratton tuning condenser and a .00015-microfarad Polar reaction condenser. You can also buy your short-wave coils from Stratton, or it is very easy to make them yourself.

Such accessories as short-wave chokes can also be made at home and, for the rest, there are only the small fixed condensers to worry about—and these are already on hand in most junk boxes.

America on One-valvers

Heaps of readers are getting Americans on the short waves every night on one-valvers. With such sets, you can get thoroughly used to the tricks of the short waves, especially in tuning and reaction adjustments. Later on you can always add a low-frequency amplifier to bring up the volume to work a loud-speaker.

In other words the one-valver is the best way to begin on the short waves, whatever you may graduate to later on.

For the expert, the most suitable circuit for short waves is a three-valver with a screen-grid valve in front of the detector. You don't get much amplification from the first valve, although there is a definite gain—but there is the great advantage that you have a much more stable detector system with very smooth reaction.

If you don't want to go in for a special short-wave set, there is always the add-on adaptor or converter for your broadcast receiver.

There are two ways. If your set has a high-frequency stage you ought to use one of the super-het convertor units, such as the Eastick one-valver. On the other hand, with straight sets like the early Cossor Melody Maker you will have to use a plug-in adaptor, which cuts out the whole of the tuning circuit of the existing set, replacing the detector valve of the set by the detector valve in the unit.

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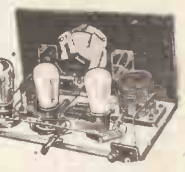


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Criticisms by WHITAKER-WILSON



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My Broadcasting Diary

Monday

SCRAPBOOK for 1909 pleased me very much. Thought it well produced and most interesting. Quite bucked because I remembered so many of the events.

Leslie Baily might find good material for a Scrapbook for 1900 to 1904. A good deal happened of interest in the first four years of the century.

The end of the South African War and the passing of Queen Victoria. Also the coming of King Edward. Not a bad idea to give us history so pleasantly potted.

Tuesday

Greatly entertained to-night in watching the technique of Galsworthy's *Loyalties*. Fine play. Always admired it on the stage. Sure the secret of its success was that it began with a theme and never left it. *No digressions*.

Gordon Gildard made an excellent job of the cutting—so much so that it was hard to tell where he had used his blue pencil.

Friday

Songs from the Shows bored me a little to-night. Not their fault, poor songs. Simply had enough of that sort of thing. Bad arrangement to have a Scrapbook, Old Music Halls and Songs from Shows all in one week. Now I suppose we shall have to go without any of these things for long enough.

Saturday

Folks In Town To-night rather an irritating lot. Didn't like any of them much.

The *Music Hall*, however, well up to high watermark. Think Beryl Orde the only real impersonator the B.B.C. has produced thus far. The rest cartoonists by comparison.

Beryl does imitate. Her impression of Gracie Fields brilliant. Sure Gracie would say so.

Beryl is on again March 27. She must do another set of people. No repetitions, please, Beryl!

The Punch and Judy episode didn't come off. Thought it wouldn't. Punch's voice far too squeaky. The Eight Dancing Relatives seemed to like him, though.

Two good singers: Robert Naylor and Sylvia Cecil. Those are the sort of singers we want. Who is Sylvia? One of the old Co-Optimists. One of the old Savoyards, too. Hope those two will be asked again.

Leslie Fuller and Co. very good in *Not So Quiet on the Western Front*. One or two weak jokes but, on the whole, quite good stuff.

Sunday

Sensible concert on the Regional to-night. Sir Henry conducting Cesar Franck's D Minor Symphony, Liszt's E flat piano concerto (Moisevitch playing it) and Ravel's *Bolero*. Thoroughly popular programme. Nobody could grumble at it.

The symphony one of the world's best; the concerto one of the most loved by the average listener.

Suggestion to Sir Henry about that *Bolero*. Will he produce a cut version? Sections too long in the first half—at all events for broadcasting. Different if you can see the players. Very exciting at the end, though. Glad I didn't play the drum part in it.

Just been looking through the whole week's programmes. A good deal that I should like to have heard, but imagine I managed to hear the pick. The programmes are improving.

Wednesday

Interested in Egon Petri playing Busoni's concerto for piano, male voice chorus, and orchestra. Can't say the work has ever thrilled me, but Petri does it as Busoni would have had it done. That I do know, because I remember Busoni in the days of my youth at Manchester.

Thursday

The Old Music-Halls was definitely a good show. Amazed that so many old favourites of mine actually came from the Palace Theatre. In *The Shadows* brought back memories. Also *Put Me Among the Girls*. Sang same lustily. Likewise *Honeysuckle and the Bee*, and *By the Silvery Moon*.

Wonder if I shall be listening in 1954 to present-day successes, and whether I shall be able to remember words and music as I did to-night? Doubt it.

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**New Stations
to Hear**

By JAY COOTE

A NEWCOMER to the ether is Radio Parede of Portugal. It is not the official Lisbon station, but a transmitter which has been built by private enterprise with funds collected from the members of the Portuguese Radio Club and other wireless enthusiasts. Although a wavelength of 291 metres was allocated by Lucerne for a station in South Portugal, and is obviously the channel on which this transmitter should work, broadcasts from Parede have been heard in this country on a different wavelength.

The tests are still being carried out and it is possible you may pick up the station between 11 p.m. and 12.30 a.m.; you will recognise it by the fact that the calls are given out not only in Portuguese but also in French and English and that the "Radio Club Portugues" is frequently mentioned in announcements.

New Polish Transmitter

On 345.6 metres, namely, one channel above London Regional, you may recently have heard a Polish transmission, as Poznan has now taken over its new transmitter, which is rated at 17 kilowatts, as against 1.9 kilowatts to which the old plant was limited. I learn that this is not the ultimate power of the Poznan broadcasts because the authorities contemplate erecting in the outskirts of that city a 50-kilowatt station which may be on the air by the end of this year.

Another station temporarily closed down is Belgrade, which will reopen on March 10, still, however, with its old transmitter. So far, Jugo-Slavian programmes have mainly been captured through Ljubljana on 569.3 metres which, during the temporary occupation of that channel by Grenoble, were not available to us. Belgrade is, however, to get a 40-kilowatt station in the near future and should then become a regular entry in our logs.

There appears to be very little doubt that with the exception of one or two stations already mentioned, there have been few alterations in the wavelengths of transmitters which, so far, have not taken up the Lucerne allocations.

Leningrad's Great Strength

Leningrad, which for a time appeared to have made an attempt to work on 1,224 metres between Oslo and Kalundborg, has now again cropped up on its old channel of 857 metres, where it comes in at great strength.

Also, perhaps, below this transmitter you may already have picked up a Hungarian broadcast. I have heard it on two occasions and have logged it as Budapest No. 2, also on its old channel.

At the lower end of the medium waveband most of the Belgian private stations had been lumped into two common wavelengths, but apparently Schaerbeek (Brussels) has now started up again on 233.5 metres, which is the position temporarily loaned to Aberdeen.

Although statements had been published to the effect that the Belgian Government had insisted on the closing down of some of these one-horse stations, they are all working just as merrily as ever and assist in congesting some of the lower wavelengths.

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Slight modifications of a straightforward nature only can be made to blueprints. For more serious alterations the minimum charge is 2/6.

Blueprints supplied by us will be charged for in addition, but of course, readers may send their own blueprints for alteration.

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MAINS plugs, with fuses included, to fit standard sockets are being manufactured by M. K. Electrical. These plugs are available in two-pin and three-pin and 5-ampere and 15-ampere types. The 5-ampere sizes can be supplied with 1- or 2-ampere fuses and are particularly useful for the protection of small appliances such as electric clocks. The new twin adaptors are also of interest, as these enable two instruments to be run from the same point. 147

Fuller Batteries and Accumulators

DO you need a new high-tension battery or accumulator? Or perhaps you are considering purchasing high-tension accumulators? These are very economical and quite inexpensive. You should write for the new Fuller catalogue, which contains details about all these batteries as well as special type for your portable set and super-capacity type for your standard receiver. 148

Television in Glasgow

RECENTLY two interesting lectures on the application of the cathode-ray oscillograph to television were given to audiences totalling nearly 1,000 in the hall of the Christian Institute, Glasgow.

It speaks volumes for the interest shown in television in this area to state that the applications for seats were over 400.

The apparatus employed was that of the Edison Swan Electric Co., Ltd.

Special Film-star Record

YOUR favourite film stars on record! A Brunswick record of fourteen film stars, including Mae West, Bing Crosby, Al Jolson, and the Boswell Sisters has just been released. You should certainly take this opportunity of obtaining a permanent record of these stars' voices. The number of the record is 01707 and the price is 2s. 6d. These records are being sold in aid of the Cinematograph Trade Benevolent Fund.

DON'T MISS NEXT FRIDAY'S ISSUE—MARCH 9



Another splendid issue out on Friday. Just look at a few of the contents below. A fine twopenny worth you'll agree. Make sure of a copy every week by placing a regular order with your newsagent.

Full page portraits of LEW STONE and

JANE CARR.

Captain WAKELAM on the Wales v Ireland Rugby Match.

Sir HENRY WOOD on "Musical America."

At Home with the HOUSTON SISTERS.

SHEILA BORRETT (late B.B.C. lady announcer) tells you "Why I came and why I went."

"How the Boat Race Is Broadcast." Etc. Etc.

RADIO PICTORIAL



GET YOUR MARCH WIRELESS MAGAZINE TO-DAY!

The contents include:

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| Short-wave Adaptor for Your A.C. Set. | World's Broadcast Wavelengths. |
| Wireless Jobs Made Easy for Mr. Everyman. | CUQ Calling. |
| The £3 3s. Three. | Deep-sea Doctoring by Radio. |
| TECHNICAL FEATURES | Radio on 17 Centimetres. |
| How to Use the High-frequency Pentode. | Midnight Adventures with the Super 60. |
| A Chat on Real Quality. | Those Broadcast Humourists! |
| A.C. Meters for the Experimenter. | Radio Luxembourg. |
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Amateur Wireless

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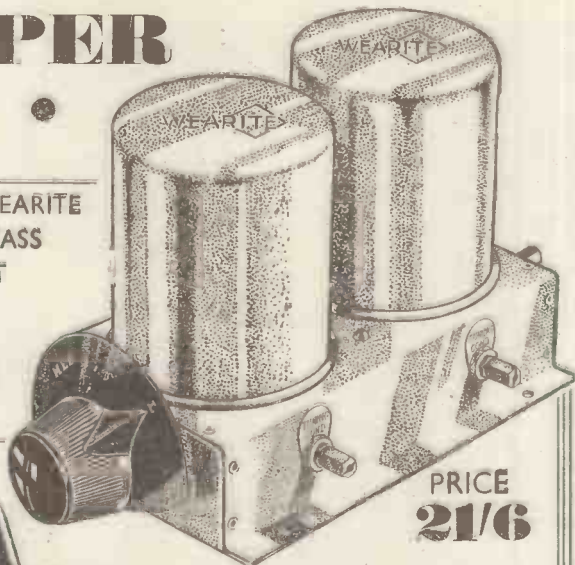
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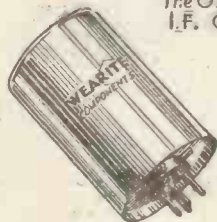
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IF YOU ARE BUILDING THE
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The secret of the amazing performance of the "Lucerne Ranger" is its coils. To get results as per the author's original receiver the coils must be identical. Wearite Lucerne Coils are guaranteed to Amateur Wireless specification.

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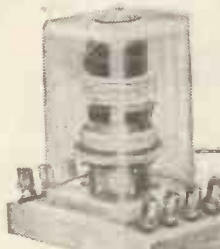
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You will want to know more about this useful component. The coupon below and a 3d. stamp to Dept. A.W., will bring you full details together with a copy of our booklet "The All Metal Way, 1934."

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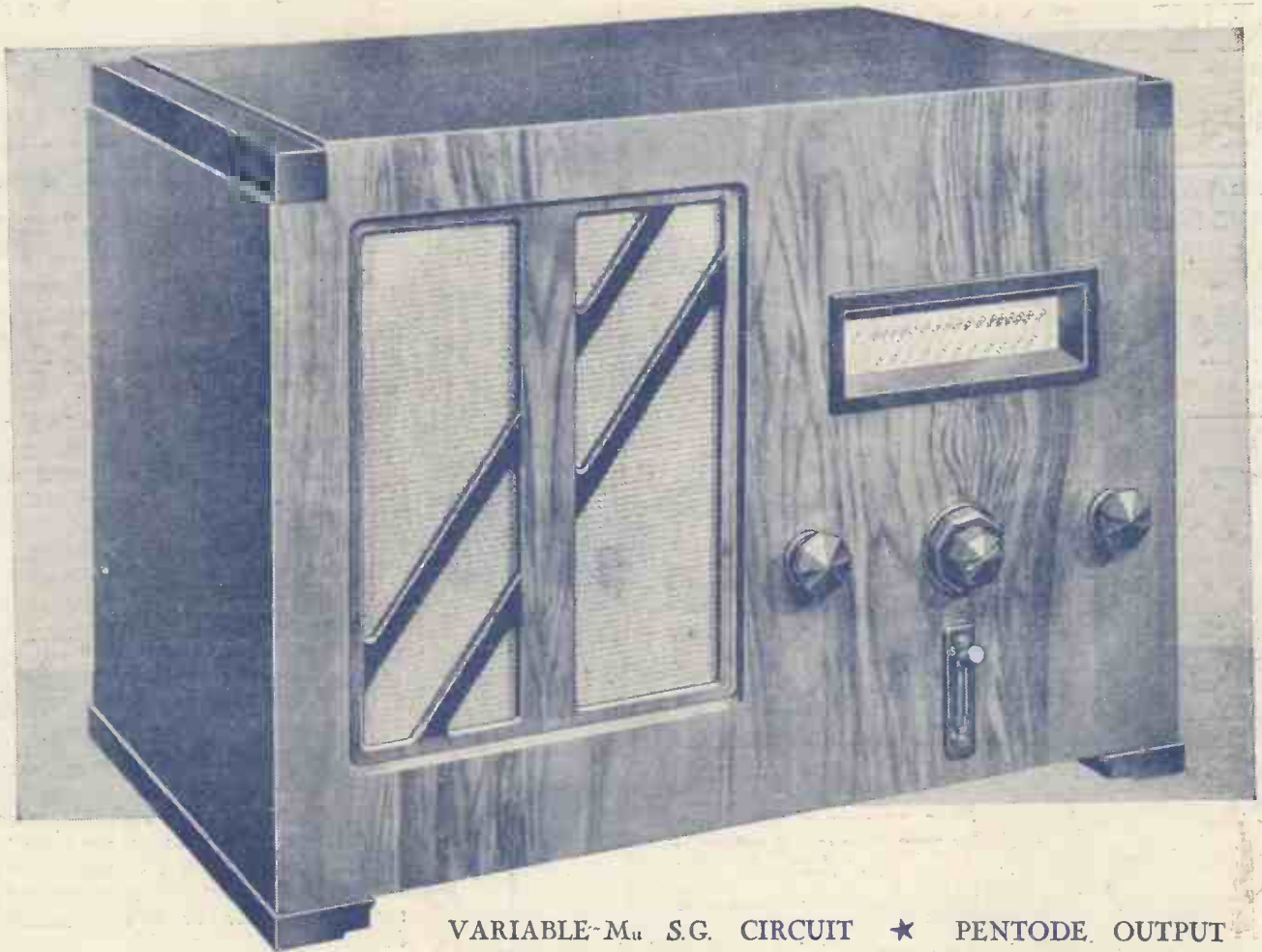
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Cossor All-Electric Receiver Model 435 as illustrated complete with Four Cossor A.C. Mains Valves, viz: MVSG Variable-mu Screened Grid, MS/PEN Screened Pentode Detector, MP/PEN Pentode Output and 442 BU Full Wave Rectifier. Mains Energised Moving Coil Speaker, single-knob tuning, illuminated full-vision scale calibrated in wavelengths (200/540 and 900/2,000 metres), wave-change switch, combined volume control and on-off switch. Handsome walnut finished cabinet 13 in. high, 17½ in. wide, 10 in. deep, with Gramophone Pick-up plug and socket, terminals for extension Loud Speaker and plug and sockets for connecting gramophone motor. For A.C. Mains only 200/250 volts (adjustable), 40/100 cycles.

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435

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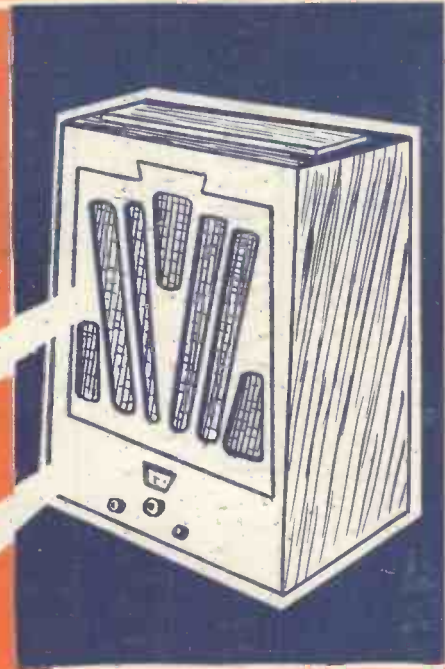
**BLUEPRINT, TEST
REPORT, BUILDING
DETAILS of the 1934
A.C. CENTURY SUPER**

**IS YOURS AN
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**QUARTZ IS A
VITAL FACTOR IN
RADIO NOW!**

REAL QUALITY

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**THE WORLD
LISTENS TO THE
BOAT RACE
and
ALL ABOUT BRITAIN'S
"PIRATE" BROADCASTER**

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News and Gossip of the Week

Distaste for Bells

RING off, wild bells! We have had enough of Bow bells. Give us back the death-watch-beetle interval signal. Or, bright idea, do away with the intervals altogether!

But J. H. Whitley thought of the bells idea. He is chairman of the Board of Governors, so no one likes to say nay to dem bells.

Twenty-four-hour Time

So the B.B.C. is trying to wish twenty-four-hour time upon us? Well, why not? The Continent has had it for years, and the B.B.C.'s internal time tables have been on this basis for the past five.

Announcers may be a bit confused at first, and so may we. But to wipe out the archaic a.m. and p.m. is surely worth a little initial confusion?

Come to think of it, the B.B.C. is about the only organisation that could put over a system like twenty-four-hour time.

Working Man Protests

ONLY about fifty words were broadcast by Mr. Ferrie, the working man, but what a sensation they caused! Told the B.B.C. where it got off, didn't he?

The B.B.C. says that his manuscript was a little irrelevant to the topic of National Character, but his outburst did draw attention to the excessive use of the blue pencil—and showed why so many of the talks are dull and lacking in personal "pep."

New Geneva Plan

BACK from the I.B.U. meeting at Geneva, our B.B.C. delegates are very "mum" about the new long-wave plan.

All the delegates agreed on a new long-wave line-up.

It includes several foreigners not now given a look in on long waves. Query—Luxembourg?

But, hold everything! There is a large snag. Until the various governments ratify this new agreement, nothing can be done. And already several governments have turned it down flat.

Daventry Safe

MEANWHILE we must carry on as best we all can with the much-amended Lucerne Plan on the long waves. Thank goodness our Daventry's wavelength is unaffected by the proposed changes—and, at the moment, is clear of heterodyne interference from foreigners.

It is, though, an uneasy business on long waves. Bound to be trouble before long, we fear.

In Scotland Now

By its move on to a new site near Elgin, the B.B.C.'s mobile transmitting van gives the lie direct to those who have been maintaining that North Scottish Regional's site was already fixed.

This field strength measuring is a laborious business, but a most important preamble to the building of a regional station.

Site means everything in service area. As a full-blown regional costs about £150,000, no wonder the B.B.C. hesitates.

Better O.B.'s

THOSE O.B.—outside broadcast—engineers of the B.B.C. are a sprightly crew. Always trying to improve their department. Probably the liveliest gang of engineers in broadcasting.

They have just put finishing touches on new equipment for outside-broadcast work—equipment designed on the rack system as in the contrl-room at Broadcasting House.

Lights Out!

ALL the lights in No. 10 studio—the wharf studio—failed, the other night, in the middle of a broadcast concert.

They could not get the lights on again for over forty minutes, but after a few records Joe Lewis, the conductor, was soon overcoming fate by candlelight.

Distant Looker

JUST as the B.B.C. is seriously thinking of cutting down its television broadcasts evidence is accumulating on all sides of widespread interest in the medium-wave 30-line programmes.

A letter has just been received from Palermo, Sicily, an experiment of their telling of good reception of our pictures.

Radio Cavalcade

FAMOUS stars of the ether will join in a radio cavalcade on April 14. A memorable Saturday night ahead!

John Henry, Clapham and Dwyer, Flotsam and Jetsam, and other stars who have made their names over the radio will be in this outstanding variety programme.

Pirate Broadcasting

ON page 278 we give our exclusive interview with the young pirate broadcaster of Norwich. It is worth recording that the Post Office detection van, so often ridiculed when it alleges "detection" of pirate listeners, is a real

slench of the ether when dealing with pirate transmitters.

In spite of the low power of the transmitter, the direction-finding apparatus proved too much for the young pirate.

Henry Hall on Saturdays

WHILE the spot of bother between the B.B.C. and Ambrose continues, Henry Hall will fill the Saturday-night dance-band feature—on March 17 and 24.

He will bring variety stars to the microphone as interludes in his dance-band programmes. See Alan Hunter's exclusive interview with Henry Hall on pages 281 and 282.

Grand Hotel Broadcasts

GET ready to hear Leslie Jeffries from the Grand Hotel, Eastbourne. His orchestra will make its microphone debut on April 22—the first day of British Summer Time.

I.B.U. in London

FOR the first time since 1925, when it was formed, the I.B.U. meets in London this June. The occasion is the general council and assembly.

There will be seventy technical representatives of twenty nations, including Russia.

French Diplomacy

BACK of the decision to put Eiffel Tower on the medium waves is *secret diplomacy*. It seems that a bargain has been struck, whereby if Eiffel Tower vacates its unlawful channel on the long waves, Luxembourg may stay up among the gods.

Novel Earth

WHEN the Boat Race is rowed on Saturday, the launch *Magician* will follow, as usual, with B.B.C. commentators complete with short-wave transmitter. The earth for this transmitter will be made of copper sheet fixed to the bottom of the keel of the launch. See the full story on page 287 of this issue.

Real Quality

YES, we all have ideas on real quality, haven't we? But how many know the right way to get it? Real quality is a specialist's job, and that is why we have commissioned Noel Bonavia-Hunt to write a special series on this great listener topic.

His first article appears this week on pages 290 and 291.



Eight good reasons why you should take up television! The Eight Step Sisters rehearsing for a transmission for the new B.B.C. television studio. (This week's television feature is on page 289)



Associated Press photo.

Meet Wilfred Barker, the 19-years-old "pirate," of Norwich. With a 24-watt transmitter he has been entertaining local listeners every Sunday morning

All About Britain's "Pirate" Broadcaster

In this exclusive "Amateur Wireless" interview, Wilfred Barker, the radio pirate of Norwich, gives the full story of his extraordinary exploits, telling of the exciting events that led up to his final discovery by Post Office officials

It was a dangerous though sporting last fling, was it not?

In a special interview with AMATEUR WIRELESS, the younger brother, Wilfred Barker, gave us the inside facts about his extraordinary exploits.

"I made and operated a wireless transmitting station in conjunction with my brother, Gerald," he explained to us. "As you have heard, we called ourselves Norwich No. 1 and Norwich No. 2, with 24 and 4 watts respectively. My brother Gerald worked the higher-powered transmitter and I, Wilfred, operated the lower-powered apparatus—which, by the way, was the one caught in the act by the Post Office officials.

"Please explain to your readers that my original intention was simply to obtain two-way conversation by radio-telephone. I was gratified to find that this stunt worked very successfully, but as it happened the general public also listened-in to our two-way chats."

It was apparently this discovery that the listeners of Norwich were interested in the activities of the two Norwich stations that set the brothers upon the trail of supplementing the B.B.C. programmes, by filling in the Sunday morning gap. Very laudable, but quite unconstitutional, of course!

"When we found out that we were being listened to by so many outsiders," went on Wilfred in his interview with us, "we decided that we would broadcast a special programme of gramophone records every Sunday morning for the public's benefit.

"Unfortunately, Norwich No. 2, which I was operating, was tracked down by the Norwich Post Office officials, and my apparatus had to be confiscated—much to my regret.

"But Norwich No. 1 was never found out, and at this moment the Post Office people do

not know where it has been situated. We have now dismantled it, so its location will remain a secret."

Now for what happened on the fateful morning of Sunday, March 4. This also we got from Wilfred, who was most anxious to tell the world the whole story.

"On Sunday morning I, that is, Norwich No. 2, commenced with a programme of gramophone records, which lasted until about 9.30. Then I picked up a well-known foreign station and relayed it to local listeners until 10 o'clock.

Two-way Conversations

"I then had a chat with my brother at Norwich No. 1, and we kept up a two-way radio-telephone conversation for some time. We then decided to close down until 11 o'clock, and then there was a suggestion that I should relay Norwich No. 1's programme.

"That never happened. There was what the B.B.C. officials call a 'technical hitch.

"So I then continued to play gramophone records until 11.45. I was just closing down with a record of 'God Save the King' when in walked the Post Office officials."

And thus ended one of the most diverting radio "pirate" escapades of recent years. The brothers have specially stressed their desire to apologise to the Post Office for all the trouble they have caused.

In the course of our conversation with Wilfred Barker we learned that his usual set was a four-valver with two screen-grid stages—a set that he listens to short waves on with the usual adaptor.

"I shall never be able to broadcast again on the medium waves," he regretted, "but I am hoping that I may be able to obtain a licence for the short-wave bands.

IN the early days of this wireless game "the amateurs" used, wittingly or not, to provide pioneer listeners with practically all their radio fare—and their activities were especially hot on Sunday mornings.

Came the B.B.C., with its monopoly of broadcasting in these islands, and foreigners galore to relieve the monotony. The amateurs withdrew to the short waves—or rather were forced down below 100 metres out of the way.

They have for years been lost to the vast majority of ordinary listeners who, with broadcast sets that do not tune below about 220 metres, have seldom if ever heard a local amateur.

Now the silence of the amateurs has been broken by a couple of young amateur transmitters at Norwich, who have been making things hum to such an extent that the Post Office has had to send up its famous detection van to track them down.

Thus the entertainment of many Norwich listeners has come to an untimely end—for the van succeeded in running the "pirate" to his lair.

Sunday Morning Concerts

Wilfred Barker, aged 19, conceived the idea of sending out these Sunday morning programmes in collaboration with his brother, Gerald Barker, aged 26.

Norwich No. 1 station sent out its concerts of records and foreign station relays on a wavelength of 279 metres, the power being about 24 watts.

Three miles away Norwich No. 2, with the diminutive power of 4 watts, was working for two-way telephone conversations between the two brothers on a wavelength of 267 metres.

As many of our readers know, amateur transmission is not allowed these days over a wavelength of 165 metres, and most serious work is done below 100 metres.

We were naturally intrigued with the story of how these redoubtable lads carried on their transmissions, in spite of the fact that they knew the Post Office officials were after them.

Coming—The Lucerne Minor

SO great has been the success of the Lucerne Ranger, designed by "The Experimenters", that they have now designed a two-valver using their famous coils.

And now they are full of the results they have obtained with what they call the Lucerne Minor, designed on the same simple lines as the three-valver, with an ultra-simple layout.

It is a two-valver, with a detector valve and a transformer-coupled pentode output stage.

But not just an ordinary "detector low-frequency" set, please note: No, something very special—really. Any set with the Lucerne coils as its nucleus must be special because these coils really do represent a startling advance in tuning technique.

They enable you to vary the selectivity to suit your local conditions, so that you need not sacrifice any more volume than your own special conditions warrant.

Secondly, their tuning range is considerably wider than that of most dual-range coils on the market to-day. On the medium waves they tune with a standard .0005-microfarad condenser from 180 to 650 metres, and on the long waves from 850 to 2,100 metres.

Another point about this little set we should very specially like to emphasize is the low anode-current consumption. The maximum

current taken from the high-tension battery need not be more than 6 milliamperes, while on the average we should say that 5-milliampères is all you will actually take.

Thus a standard-capacity type of high tension will be worked, perhaps for the first time, within its rated output capabilities, which means that it will give many months of service before having to be renewed.

The Lucerne coil to be used in this new set is the grid coil, with reaction. So if you want to make this set with your own assembled coil get on with the job in readiness for the full design next week.

Extremely Simple Wiring

As with the three-valver, the layout has been arranged so that a plan view gives you practically the whole story at a glance.

The price, in accordance with our new policy, has been kept down to the minimum consistent with the need for using first-class components.

The cost, including a slow-motion tuning condenser, and the best makes of fixed condensers is only about 27s. At this price many thousands of readers anxious to make the most of the new Lucerne Plan will be able to build the Lucerne Minor and so gain the full advantage of the new ether conditions.

1934 A.C. Century Super

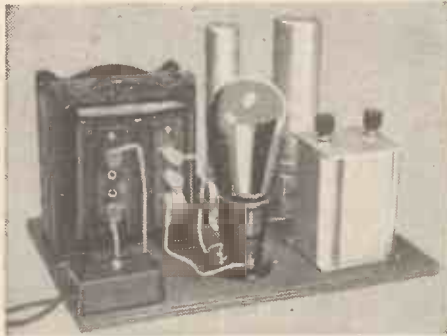
Construction and Operation Explained by
the "A.W." Technical Staff

LAST week we gave you a good idea of the how and why of our A.C. Century Super. We asked you to study the theoretical circuit diagram (reproduced on page 280), and so by now you will be fully aware of the many technical advantages of this new design.

Summarised, the technical facts of the A.C. Century Super are: Seven-valver, including high-frequency pentode first detector, two variable- μ intermediates, three-in-one second detector giving self-adjusting volume control, triode output, triode oscillator, and finally a full-wave mains valve rectifier.

Now for a few words on the actual construction. As you will see, it is designed on the

top, five five-pin and one seven-pin. The holder on the extreme left is for the oscillator, and at the back is the first detector holder. The two holders behind the aerial and earth terminal block are for the intermediate-frequency valves, while the seven-pin holder is for the double-diode-triode second detector. The remaining holder is for the power valve.



A view of the separate mains unit for high- and low-tension supply

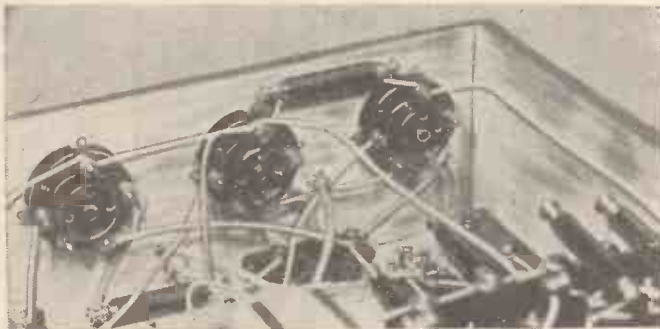
The only other parts of importance on the top are two fixed condensers, for by-passing the grid-bias resistances. There are also five or so metallised wires coming through from underneath. These *must* be earthed, and earthed well, in order to avoid crackles and instability. Of course, it is the *metal covering* that is earthed, *not* the wires inside them.

Underneath are mounted three more control components. At the centre is the knob controlling the wavelength ranges of the oscillator coil. This coil is mounted on a metal bracket, as are the other two components on the left and right, respectively the on-off switch and the volume control.

You will see that at the back of the chassis, on the supporting piece, there are three valve holders. These are for the intermediate-frequency coils. Make sure you get these the right way round. The anode terminal of the valve holder goes to the grid terminal of the following valve.

The rest of the layout can easily be followed from the full-size blueprint, available as usual, price 1s. 6d. post paid. See the half-scale reproduction on the inside covers.

When you come to the wiring-up stage in the construction, note particularly that the positive



The valve holders on the side of the chassis are for the intermediate-frequency bandpass filters

The 1934 A.C. Century Super installed in its radio-gramophone cabinet

chassis system, with Metaplex for the baseboard and chassis supports.

On the top of the chassis at the centre is the band-pass coil coupling the aerial to the grid of the high-frequency pentode first detector. This has been designed by Wright & Weaire to work with their intermediate-frequency coils, and gives a frequency separation of 9 kilocycles.

This is tuned by a double-gang condenser, having a single main knob control, with a concentrically mounted trimmer knob. With this control you can get the last ounce out of the set by slight readjustments when the main knob has found the required station.

At the right-hand side is a single tuning condenser, which is connected to the oscillator coil. Make quite sure that this condenser makes good contact with the metallised chassis. When tuning-in you will find that this condenser has a very sharp adjustment, a degree or so cutting out the local station—however powerful it may be.

There are six valve holders on the



Note the handsome appearance of the Dallow radio-gramophone cabinet for the 1934 A.C. Century Super

sides of the electrolytic condensers used to by-pass the bias resistances go to cathodes, the negative sides going to earth.

For wiring we use No. 20 gauge tinned copper, with insulated sleeving of 1 or 1.5 millimetre to cover the bare leads. Follow the blueprint sequence, crossing off each wire on the blueprint as you actually make it in your own set.

A word about the mains-unit construction. Three windings are on the transformer. One provides the high tension, another the filament voltage for the rectifier valve, and the third the filament voltage for the six receiving valves.

High-tension Connections

The output of the high-tension side is connected across the anodes of the rectifying valve, and the centre point of this winding then becomes high-tension negative. The positive high-tension is the centre tap of the filament winding, which is connected across the filament of the rectifying valve. This is a point to remember; many people imagine that the positive high tension must come from the middle of the high-voltage winding.

There is only one smoothing choke, which is in the positive lead, this being by-passed by a 4-microfarad condenser on the reservoir side and an 8-microfarad electrolytic condenser on the output side.

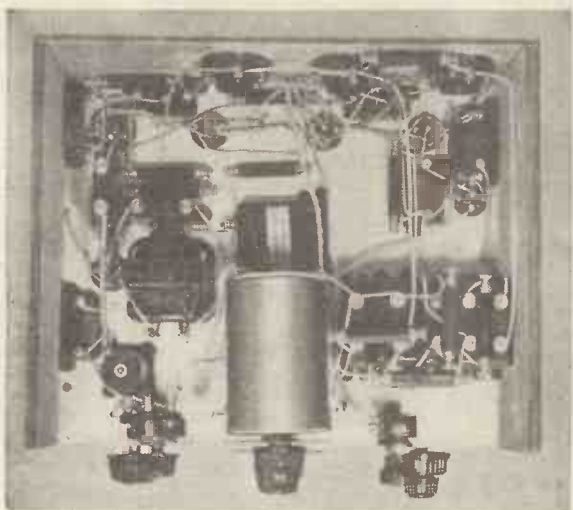
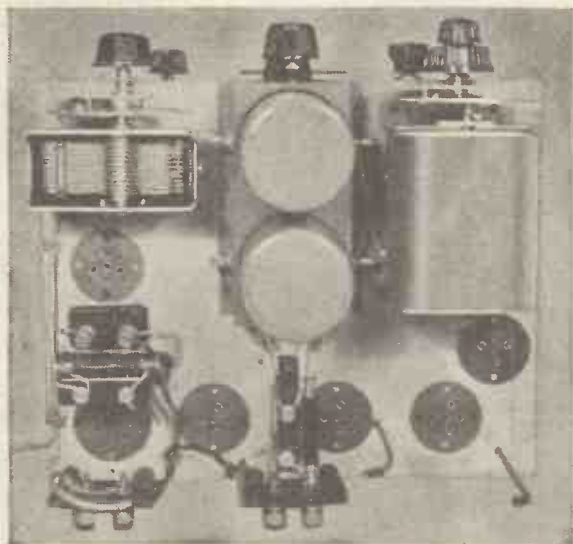
While we were preparing the blueprint of this set one or two specially important points about the construction cropped up. These we pass on for your benefit.

First, note that on no account must the braided wire, used for the connections to the tops of the first four valves, come in contact with the metal cans of the intermediate-frequency transformer.

Secondly, it is a very good plan to cut short the metal braiding by about half an inch, so that there is no possibility of the metal braiding, which is earthed, of course, coming into contact with the wires inside the braiding.

If you want to make a good neat joint, use a little Empire tape to bind the frayed ends of the braiding, thus preventing any subsequent accidental contact between the vulnerable points.

We now come to the question of



These top and bottom plan views of the set should be examined in conjunction with the blueprint on the inside covers. A list of parts appears with the blueprint

operation. It is really quite straightforward. Connect the aerial and earth to the two terminals provided at the back. For most readers an aerial wire with a total length, including lead-in, of 45 to 50 feet will be ample. But for the few readers who are a long way from any station, needing the absolute maximum volume, this length can be increased to about 75 feet.

Ganging of the band-pass tuning condenser is simplicity itself. You will notice that this condenser is calibrated in wavelengths, so the best thing is to tune-in to a known station and then adjust the trimmer on the back half of the condenser until the dial reading is approximately that of the wavelength of the station.

For example, tune in London National, and adjust the trimmer in conjunction with the main condenser until the dial reading is

approximately at the 260-metre mark.

After this initial juggling, the little trimmer need not be touched, and you can obtain the final tuning adjustment on the front trimmer—that is, on the little knob superimposed on the main tuning control knob. That is all there is in the ganging—very simple indeed.

The volume control, you remember, is on the low-frequency side of the set, and works in a clockwise direction. At the beginning of your experiments set this control at about 9 o'clock, and then rotate the oscillator condenser very slowly indeed, with the band-pass condenser following at approximately the same dial reading. You will soon find a station, either a local or a foreigner, and then you can make the volume suit your tastes by varying the volume control knob.

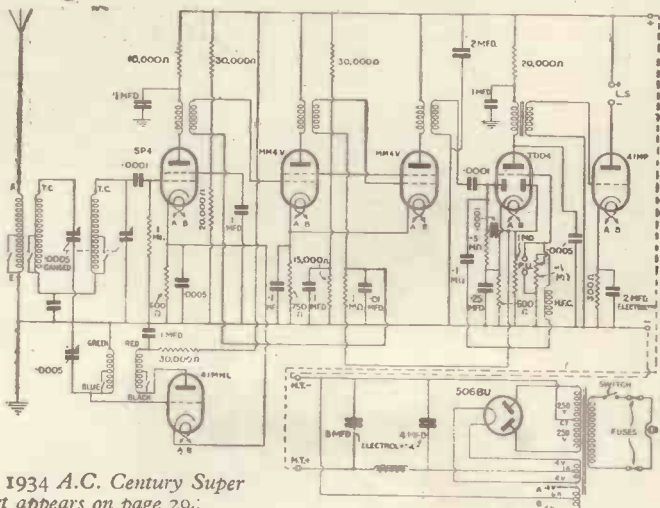
We advise you, at the beginning, to tune in the London National and then keep on turning both condensers in step in a clockwise direction, until you reach the next reliable English-speaking station—such as the West Regional.

Then go on ignoring all the intermediate foreigners, logging in turn the London, Midland, and North Regionals. By then you will know just whereabouts the land-mark stations are on your set—and then you will find it easy to log the intermediate foreigners.

A little point we have often noticed is that beginners switch over the oscillator to long waves, and forget all about the band-pass coils. As a result they tune in a station like Luxembourg, and instead of this being followed by another long-waver they get, say, London Regional—much to their amazement.

Of course, the proper idea is to switch the oscillator and band-pass coils to the right at the same time, or to the left for medium waves.

If you are going in for a gramophone pick-up with this set, don't forget that the volume control works only for radio reproduction. You need, therefore, a pick-up with an integral volume control; any good make with an output of not more than 1.5 volts can be connected straight on to the pick-up terminals at the back of the chassis. The pick-up must be disconnected when the radio is on.

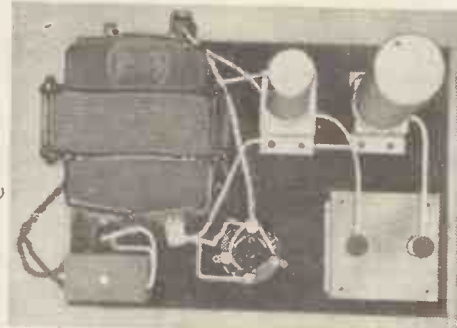


Circuit of the 1934 A.C. Century Super
A test report appears on page 294

A really good moving-coil loud-speaker is more than justified with this set, for its triode output valve delivers simply wonderful quality if given half a chance.

Well, that is all we need tell you. The rest is up to you. We have provided you with a first-class design for an A.C. mains super-het, incorporating every refinement that has proved its worth in actual practice.

With this powerful super-het you can range Europe, getting the maximum satisfaction from the new Lucerne Plan. Moreover, you



A plan view of the mains unit, built up separately

will easily be able to log America if you care to sit up after midnight.

On the long waves this set provides a very fine degree of station separation. Kootwijk, which is only 7 kilocycles from Radio Paris, can easily be separated from the usual French background—no mean feat, as owners of most sets will agree.

We do feel that this set will meet the needs of a large section of our readers who are fortunate enough to be in houses fitted with A.C. electric-light mains.



Using the 1934 A.C. Century Super for gramophone-record reproduction

All the virtues of the battery-model Century Super, with the added advantages of A.C.-mains valves, make this new set an outstanding example of the modern super-het.

If you are interested, please write to us about the design, and tell us what you think of it. Your comments will be greatly valued, as they will help us by giving us a better insight into your reception needs.

For present-day reception a super-het is ideal, and among recent home-constructor designs we can think of no set that comes up to this 1934 A.C. Century Super.

Celebrate with Henry Hall!

On March 15 Henry Hall completes two years of continuous broadcasting with the B.B.C. Dance Orchestra. He will celebrate the occasion with a special programme—every listener must hear it. Here ALAN HUNTER records an exclusive interview that will intrigue all listeners

TWO years of Henry Hall and his B.B.C. Dance Orchestra. Eight hundred hours of his dance music. Worth talking about, what? I thought so as I swung into the B.B.C.'s headquarters at Portland Place. My mind flashed back to that memorable day in March, 1932, when Broadcasting House was still echoing with the efforts of a thousand builders and decorators, when the new B.B.C. "Big House" was hardly inhabited, when the central tower was but an empty shell of studios.

Rehearsing the New Band

To that day when, with a privileged few, I was shot up to the top floor, to what was already known as the Military Band studio, to see and hear Henry Hall rehearsing with his newly-formed B.B.C. dance band.

Two years have passed, momentous years for Henry Hall. Years in which he has undoubtedly built up for himself a vast following, not only in this country and on the Continent, but in the remote corners of the Empire.

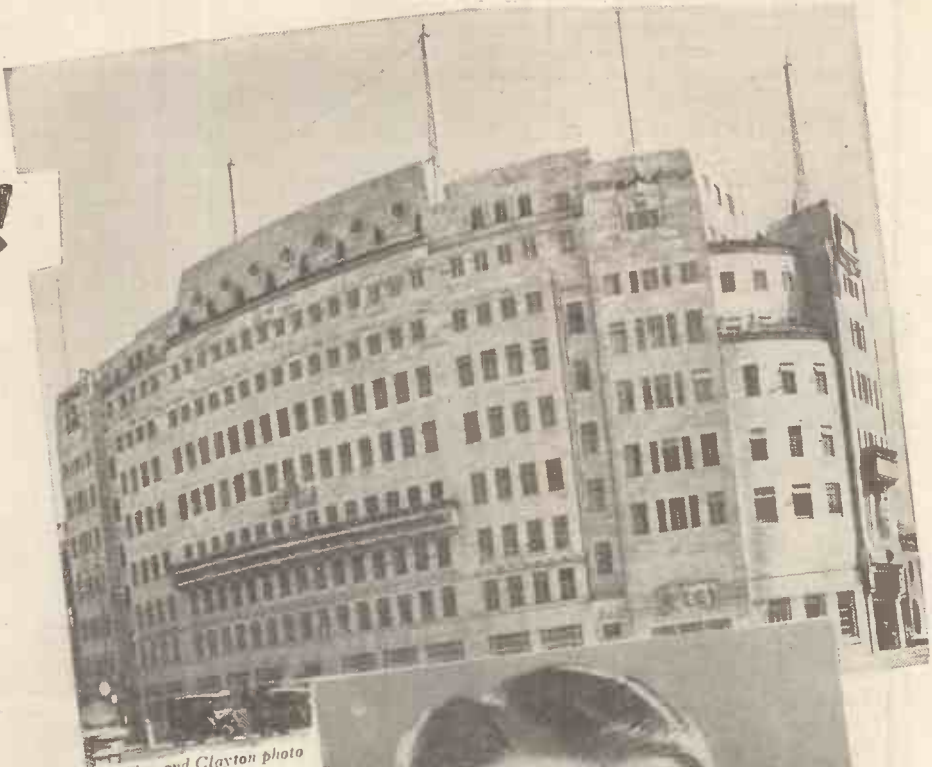
I was musing thus when Henry Hall himself walked into the room. Just the same Henry, complete with bow tie and boyish smile, ready, as always, to talk shop, to talk about the only shop he is interested in—his dance band.

"Good afternoon, Sir Henry



Keystone photo: Henry on holiday—with son and daughter. Aren't they cute?

Eddie Carroll. New pianist joined a few weeks ago: Worked previously with Hal Kemp, Al Starita, and Lew Stone. At 17½ was leader of his own band. Has great chance under Henry Hall.



Kitching and Clayton photo

Hall," I jokingly introduced myself, and Henry laughed. "It is surprising how many people, especially on the Continent, address me *that way*," he responded.

"And now, Henry Hall, tell me what you have been doing in the two years since I last interviewed you. Particularly do I want to know whether your sweet music plans have been

Henry Hall's Who's Who

F. Burton Gillis. Leads the saxes. Plays them all—soprano, alto, and baritone. Trained for clarinet, and plays that, too.

E. Cromar. Master of many instruments. Plays alto and baritone sax, clarinet, violin, and trumpet.

Freddy Williams. Plays alto and bass sax. Also good clarinet player—one of the B.B.C.'s "finds."

J. Kitchenor. Violinist. Straight from Trinity College of Music to the B.B.C. band.

L. F. Wilson. Trumpet player—many say the finest in the country. Great asset to the brass section of the band.

W. Mulraney. Trombone player. His tone suits the microphone. Helps to give brass section its special colour.

George Dickinson. Guitar player.

T. Farrar. String bass.

Len Bermon. Drummer and singer. Had a very wide experience before coming to the B.B.C. band.

Les Allen. Vocalist. Hails from Toronto. Has made a real study of the voice. Been in this country over ten years.

Cyril Hellier. Violinist. Graduated at R.A.M. Brother of Clifford Hellier. Composed with him "Singapore Serenade," "Red Resin," "Chinese Rhythm" and "Blue Strings."

Jack Halsall. Tenor Saxophone, clarinet and flute player. Was with Billy Cotton's band before coming to B.B.C.

Arthur Williams. Second trumpet. Another Billy Cotton man. Recorded with Henry Hall's Gleneagles band.



For photo

Henry signed this portrait for AMATEUR WIRELESS—"Here's to the next time!"

fulfilled—you seem to play a lot more hot numbers than you used to."

"That may be—I have to cater for all tastes," replied Henry Hall. "But I am sure everyone will agree that my band is *still* the sweetest combination on the air to-day.

"When I started two years ago there was, as you remember, a glut of heavy brass in dance music. I thought listeners would welcome a change. And I wanted to try something new—to give them sweet melodies.

"Everyone knows what happened. Some listeners did not like the new-style dance music broadcasts, but thousands sent congratulations. Since then I have tried every type of number, have met listeners half way,

so that now I think I am pleasing the vast majority of listeners.

"Experiments have been going on all the time. There have been changes in the personnel, but the main instrumentation of the band is very much what it was when you heard it two years ago."

Youthful Oboe Player

"Except for the oboe player," I murmured. You remember him, of course? A youth with an amazingly sweet tone. When he left the band it lost some of its sweetness, but gained a second trumpet to strengthen the brass.

"Well, now, after two whole years," I

course, Phyllis has gone on to fresh fields, which I am sure she will have little difficulty in conquering.

"I am always being asked why the band does not play more concert interpretations during the afternoon," went on Henry Hall, "but what people are apt to forget is that at 5.15 p.m. I am virtually ending the daytime programmes—just as the late dance bands end the evening programmes.

"My broadcast follows all manner of talks, organ interludes and light-orchestral concerts. What people want during my hour, surely, is *dance* music—and that is what they get."

But when Henry Hall takes over Saturday nights, for two weeks he is taking up quite a new angle. He is making Saturday a sort of dance-band guest night.

"I shall bring to the microphone well-known theatre and variety artists," he promised, "and they will act as interludes to the dance-music numbers played by my band."

Henry Hall is a great believer in the value of topicality. He sees that broadcasting can make known in a night to millions tunes that would otherwise

favourites will be there, such as Phyllis Robbins, Jack Phillips—and the boy oboe player.

"Oh, and then a flash-back to Olympia, to the memory of that amazing applause. Do you know, after our show there, a record of the ensuing applause was taken—it lasted for just over three minutes. A long time to stand up on the stage and bow, I can assure you!

"Among the Boys"

"Don't forget to tell your readers to look out for a surprise item. They will probably be most interested in a medley I have specially arranged in order to introduce each member of the band to them over the microphone."

"Among the Boys" it will be called. Each member of the B.B.C. dance orchestra will do his stuff in the course of the medley, which will introduce some of the outstanding hits of the past two years.

Henry Hall has a great team of "boys" for his B.B.C. Dance Band, with whom he is personally very popular. I know he will be as delighted as they are with this idea of bringing each one in turn before the microphone.

Two Years' "Hits"

You can trust Henry to produce a really tuneful medley, for he is a master in the art of musicianly orchestrations, and in the past two years there have been many fine "hits" to draw upon. Yes, the medley should be good.

I was getting all this down as quickly as possible when I glanced up at the clock. It was ticking inexorably towards Henry's zero hour of 5.15 p.m. We had to end up in a hurry.

As Henry was dashing away I pinned him down for a last question. "What of the future, Henry? Any truth in all these rumours about a bigger and better band?"

"No, certainly not a *bigger* band. Each member is a picked soloist, don't forget. That is how I get the colour into my numbers. No need for any more players. Remember it all has to go through a microphone. Have developed my band for the microphone. Instrumentation means more than numbers. It's just the time for dancing, now, so here's to the next time!"



Keystone photo

Henry at work—with Christopher Stone and Harry Jacobs

prompted, "I suppose you have some pretty decided ideas on broadcast dance music? Crooning, for example—what have you decided about that very vexed question?"

"To my mind," replied Henry Hall, "crooning has established itself as a definite technique of singing. It *had* to be developed for the microphone. However much criticism there may be about crooning, I think it will always be necessary in broadcasting."

Somewhat surprised by this firm stand, I asked for the full case in favour of crooning.

"It is very easy to explain. Crooning succeeds because it brings the personal touch into the home—into the living-room or drawing-room, or parlour. There is something much more intimate about a singer who croons into the microphone than one who stands back and sings straight.

"The crooner is appealing to a small circle all the time. A few feet away from him you cannot hear anything. Because his audience, right from the start, is so limited, he gets into the home in a way the singer trained to exhibit before a large concert hall never does."

That certainly seemed good enough sense to me, though I could not help remembering all the recent talk about cutting down crooning. Naturally the name of Phyllis Robbins cropped up, and it was here that I gained some idea of Henry Hall's policy.

Women Crooners

"I try to keep in touch with popular opinion," he explained, "so that when a little while back there was a vogue for women crooners I picked the most versatile who happened to be free at the time—Phyllis Robbins."

There never was any question, apparently, of making a permanent appointment of a woman vocalist, but Phyllis Robbins certainly did score a hit with many listeners, and she had a good run with the band. Now, of



Phyllis Robbins, versatile vocalist, crooned her way with Henry Hall's band into listeners' hearts

be heard by a thousand or so at the most.

We came to Henry's anniversary programme for March 15.

"It will be a programme of *flash-backs*. I shall pick out the most outstanding incidents in my two years of B.B.C. dance band broadcasting. I shall recall, for example, how we played before their Majesties, the King and Queen, and before his Royal Highness, the Prince of Wales.

"I shall remind listeners that my voice was the very first to broadcast from this building.

"Val Rosing, my original vocalist, will come back for this programme. In fact, all the old

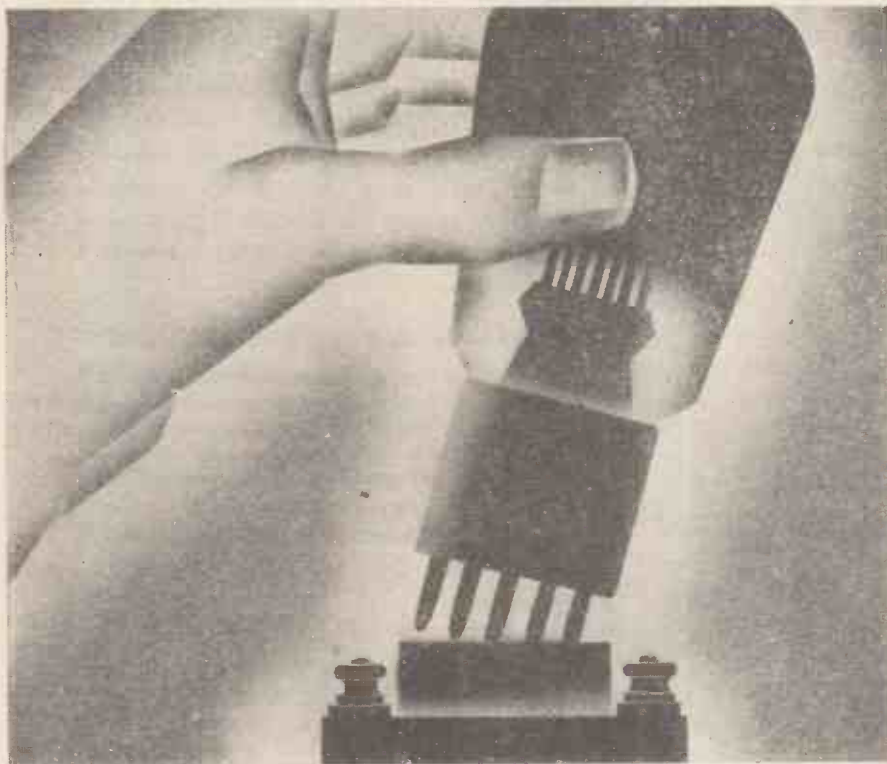


Keystone photo

Henry at Olympia—busily signing autographs for his innumerable fans

Mullards have always had you in mind...

You and the future are always the two vital concerns of the Mullard Research Department. Every step we have ever made, every development in the radio industry which has emanated from the Mullard factories, has always been achieved with the



purpose of helping, of furthering *your* interests. Never has the British listener found our organisation using public goodwill as a mere stepping-stone for experiment, for innovation. Our every advancement which has come within the public reach, has first been tested, been proved under conditions exactly parallel to those existing in the ordinary, typical British home, with the inevitable result that when you plug a new radio valve into your receiver, if that new valve bears our name, you can fully appreciate how far the name Mullard is your radio Guarantee.

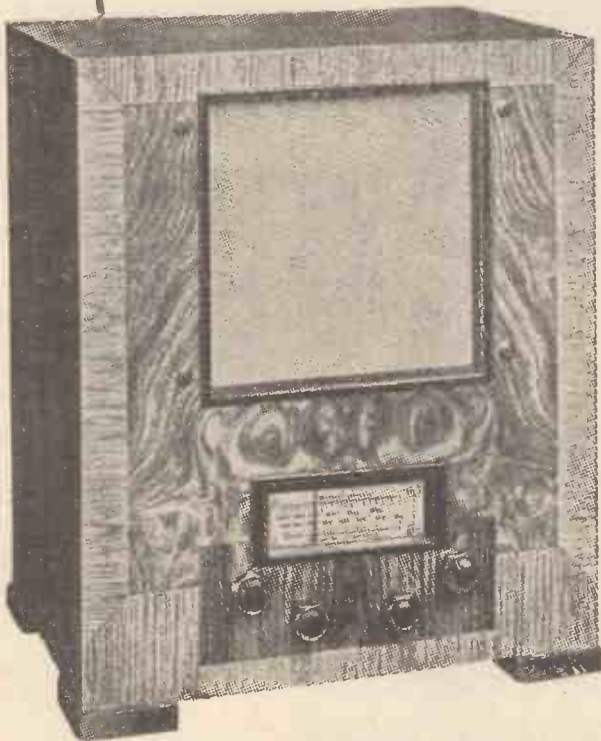
MULLARD BATTERY VALVE RANGE

PM22A	2-volt Low Consumption Pentode.	PM2DX	2-volt Detector and General Purpose Valve.	PM12A	2-volt Screened Grid.
PM22	2-volt "Super Power" Pentode.	PM2A	2-volt Power Output Valve.	PM12M	2-volt Multi-Mu Screened Grid.
PM2B	Class "B" Output Valve.	PM202	2-volt "Super-Power" Output Valve.	PM1HL	2-volt Non-Microphonic detector.

The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2.
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AN AMAZING ACHIEVEMENT!



Something new has come into the radio world—a great achievement!

You can now get a wonderful, all-electric, superhet "His Master's Voice" radio—with all that marvellous quality and purity of tone for which this great name stands—for as little as 12 guineas, or £1 a month, a matter of a mere 5/- a week!

MADE TO MEET LUCERNE WAVELENGTH CHANGES

Here is the radio you have always wanted—radio that will speak and sing and play for you in pure, natural, life-like tones; that will separate completely one station from another; that will give you volume when you want volume, without distorting the natural qualities of the music or voice; radio that, with the very beauty of its fine walnut marquetry cabinet, will be an ornament in your home! Notice the ease of tuning. The energised moving coil speaker is of the latest type and A.C. mains can be used as an aerial.

LISTEN TO THE TONE!

Get your dealer to demonstrate the Four-Forty right away and let the tone decide! 5 valve (including rectifier) A.C. model 12 guineas, D.C. model 13 guineas. Or by hire purchase.

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On Your Wavelength

By Thermion

Norwich Calling!

THE Norwich broadcasting stations No. 1 and No. 2 had a short life and a gay one. A good many readers, I expect, picked them up on Sunday mornings, working on a wavelength just below 300 metres.

Everything was done in style. There were gramophone records, handled after the Christopher Stone tradition, and station announcements, including the reading of newspaper reports on the "mystery" stations.

On the last day of their brief existence, Norwich No. 1 closed down hurriedly, but No. 2 continued at work for some time. Then the announcer told the world that the broadcasts had come to an end and that there would be no programmes on the following Sunday.

The G.P.O. people state laconically that Norwich No. 1 and No. 2 were the handiwork of a youth in his 'teens, who was operating two transmitting sets.

(See the full story on page 278.—ED.)

Dose of Sparks

SOME years ago the small town in which I live suffered from a terrible outburst of spark-signal interference. As it is just about as far inland as any place could be in this country, we are not bothered much in the ordinary way by spark troubles, but at that time we had our full measure, and a bit more besides.

The tuning was so broad that the interference was present all over the medium waveband. Investigations showed that the transmissions consisted of messages sent *en clair* in halting Morse with many mistakes.

It took some time to track down the culprits, who were eventually found to be a couple of schoolboys who had rigged up spark transmitters and were engaged in passing the time of day with one another at their respective homes. They had great fun while it lasted.

Broadcasting Strike

WHAT must be the first broadcasting strike on record—in this country, at any rate—took place at Cardiff recently.

The Cymrodorion Society (and what does that mean, whatever, please?) was holding its annual dinner, and it had been arranged that songs by Mme. Jennie Ellis and Mme. Dolan Evans with her Welsh Ladies' Choir should be broadcast.

Unhappily, the after-dinner speakers spoke too long, as after-dinner speakers sometimes will. The news had to be broken to the ladies that their turn could not be broadcast.

As a mark of their disapproval, they refused to sing any more; and really I don't blame them. Eventually, they were persuaded to do so, but the songs could not be broadcast.

"Adapting" a Talk

HARDLY had I written the foregoing paragraph when I heard of yet another person's refusing to do his stuff before the microphone. This time it was a motor-works employee,

Mr. William Ferrie, who was billed to contribute to the "National Character" series of talks.

When the time came, he told us that the manuscript of his talk had been so censored, altered, and cut about that he refused to give it. The B.B.C.'s version of the affair is "Mr. Ferrie's manuscript was adapted in various ways."

There must, I suppose, be a censorship of talks, but it certainly should not go too far. To adapt is a wide term, and if it did really mean entirely altering the manuscript it seems to me a pity that this should have been done. I don't think it does much harm at any time to hear all sides of a question, provided that nothing outrageous is said.

Surely censorship should confine itself to seeing that a talk contains nothing that offends against ordinary good manners?

Eiffel Tower Reforms

ONE result of the recent long-wave conference is that the Eiffel Tower is in future to be a good boy.

Very shortly the station will cease to cause trouble on the long waves. With reduced power it is to make its bow as a medium-wave station, working presumably on one of the French common wavelengths.

Though I am very glad to hear this, I cannot help shedding a metaphorical tear over the disappearance of the Eiffel Tower as a long-waver. Do you realise that it was the first broadcasting station to work regularly in the whole of Europe, if not indeed in the whole world, for it was transmitting programmes before broadcasting made its bow in the United States.

When Long Waves Were Long

IN the early 1920's the Eiffel Tower used a wavelength of 2,760 metres, as near as I can remember. Anyhow, I know that it was over 2,600. For some time it was the only long-wave station at work, and one simply had to hear it.

Most of us made our own coils in those days, and I recall the big "slabs" or baskets that we used to turn out specially for the Eiffel Tower.

There was also some experimental telephony to be heard between 3,000 and 5,000 metres at times; so we made bigger slabs and bigger baskets for that.

I remember that I even produced one set of coils which would receive St. Assise, the big French commercial station, which used to work—and probably does still—on 22,500 metres.

Searchlight on Lucerne

THE recently published report of the International Broadcasting Union on the wavelengths of stations for the latter half of January well repays examination. It shows very clearly that comparatively few stations possessed plants good enough to work the Lucerne Plan properly when it first came into force.

Only twenty-two stations on the medium waveband were able to keep within the permitted deviation of their allotted frequencies. The best-behaved countries were the Irish Free State, Italy, Sweden, and Germany.

The B.B.C. stations did not wobble seriously, but only the London and West Nationals, sharing 261.6 metres, and Bournemouth and Plymouth, sharing 203.5 metres, scored full marks.

All of our own stations have tuning-fork control, and the fact that there were measurable deviations by the majority of them makes one wonder whether the Lucerne ideal of a maximum deviation of 50 cycles for stations with channels of their own and 10 cycles for those sharing certain kinds of channels can be realised in actual practice.

Some Wavelength Wanderers

THERE were some very bad instances of wobbling and wavelength wandering in the early days of the Plan. Some still remain with us, but most stations are improving in the matter of wavelength-keeping.

The Spaniards are still pretty bad, and a good many of the Russians show room for improvement. Some of the smaller stations in Norway and France have strayed rather badly, and one or two of them are still at it.

On the whole, though, the Lucerne Plan is working remarkably well and the number of stations receivable to-day on the medium waves is certainly greater than it was before January 15. Once the position on the long waves is cleared up, there won't be very much wrong with long-distance reception in this country.

Diagnosing Interference

THE Marconiphone people have had a real brain-wave in the matter of man-made and other interference with wireless reception. They are issuing to all their dealers gramophone records of the typical noises produced by interference due to a large variety of causes.

If the dealer is sent for to cope with a case of noisiness, he takes his records with him. He switches on the set, hears the unwanted sounds, and then puts on a record which he plays until he finds a portion of it



Vivian Ellis and Frances Day, both well known to listeners, try out the new 12-guinea super-het while having tea at the H.M.V. studios

which produces sounds of the same kind. He then refers to the handbook, which accompanies the record, in which he finds the possible causes of the interference and such steps as can be taken to prevent it.

For Listeners, Too!

I DON'T know whether these records will be available for the listener, but I should think that they would have quite a good sale if they were put on the market. Heaps of people are completely mystified when noisiness occurs in knowing whether it is due to atmospheric, to a defect in the set, or to radiation from electrical machinery, flashing signs, and so on.

It does not take long to recognise typical kinds of noisiness and, once you have got the various sounds into your head, you can track down the source of trouble fairly quickly. Here's an instance. The noises made by a loose connection are very similar to those due to atmospheric, since both take the form of persistent or intermittent crackles.

Hearing the crackles, we suspect one or other cause. Which is the real one? The old tip about removing the aerial and earth is by no means infallible, for a modern sensitive set can pick up a good deal of atmospheric interference without any aerial at all. Instead, rap the cabinet of the set sharply and see whether this produces an outburst of crackles. If it does, you can be quite sure that there is something partly or entirely adrift.

The Air Cell

A WEEK or two ago I mentioned the air cell, that rather remarkable primary cell designed for filament-heating purposes, which employs air as its depolariser. When I wrote I had made inquiries, but had been informed that it was not obtainable in this country.

However, a reader has just sent me an address from which it can be obtained, and I have written forthwith for particulars.

The air cell is shown by laboratory tests to be able to supply up to .6 ampere of current for

over a thousand hours. Since it requires no attention and is as handy as a dry cell, it should be the very thing for short-wave sets used in far parts of the Empire—provided, of course, that the price is within reason.

Five-bob Battery Twins

OWING to unforeseen circumstances, I could not acquire my new pair of five-bob batteries for test until the day before this note was written. If you remember, a reader claimed that with a load of 7 milliamperes he obtained an average of eleven weeks' service at not less than forty hours a week from 120-volt batteries costing five shillings each. Two of these, bought from the very same shop, have now started an eleven-weeks' test in my lab., each being run for six hours a day.

Voltage Reports

THE voltages of these two batteries will be reported each week in these columns, and you will be able to see for yourselves precisely what their condition is. I would like to say that under the test they are being given every chance, and no one will be happier than I if they turn out to be really fine performers.

The Rickmansworth correspondent who made the claims originally states that his set requires 7 milliamperes. This I take to be an average figure, but, as I am starting my batteries with a 7-milliampere load, this figure will, of course, become very much less as the voltage falls.

Here are the figures at the start of the test:—
Battery A.—Open-circuit voltage, 127.2; voltage under load, 125.6; voltage after six hours, 114.8.
Battery B.—Open-circuit voltage, 126.8; voltage under load, 124.8; voltage after six hours, 114.

I want to mention right away one very good point about them. Each of these batteries shows initially a lower internal resistance than I have ever before found in standard-capacity batteries. I only hope that it will last.

Ohm in the Looking-glass

IN the new heptode or pentagrid converter the "conductance" of the valve is a useful factor in estimating its efficiency as a frequency converter. Unfortunately the only recognised unit we have for measuring conductance is the word derived by writing "ohm" backwards. Of course, in one sense it is apt enough since conductance is the reverse of resistance, but it is anything but agreeable to look at.

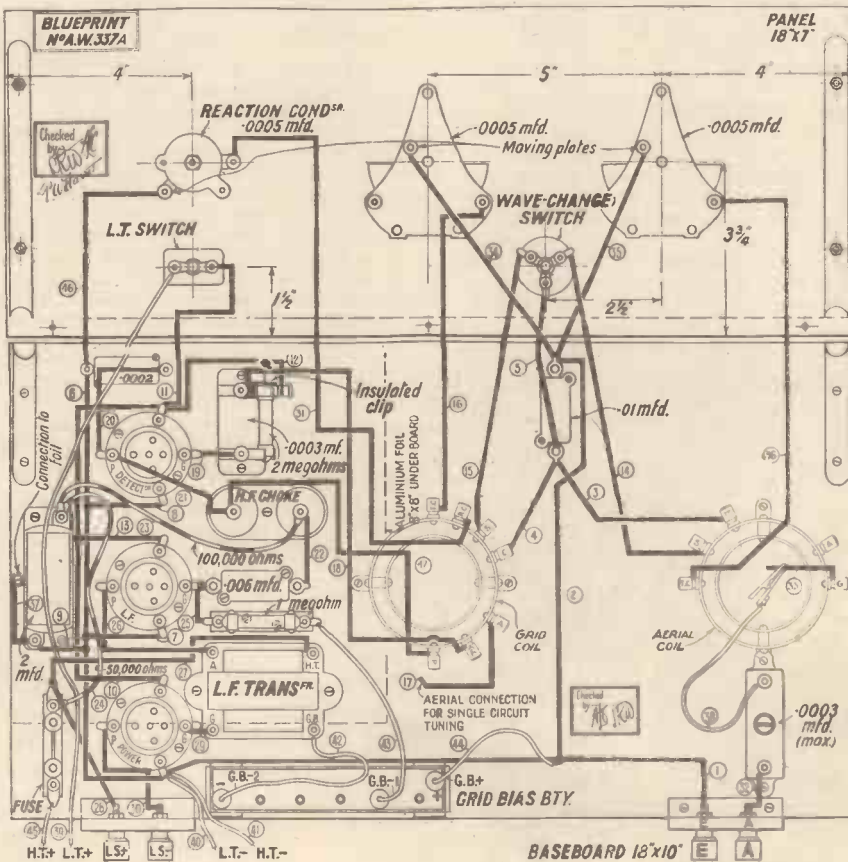
Luckily, the plural doesn't follow the strict rule of reversing "ohms," but is written mhos (pronounced "mose") instead. Apart from other objections, it seems hardly fair to overwork poor old Ohm in this way, seeing that we have plenty of "pioneers" left, such as Fleming, de Forest, and Marconi. From amongst one or other of these famous names it should be possible to find conductance a "unit" of its own, specially now it is threatening to come into the limelight.

Looking at Microbes

DR. VLADIMIR ZWORYKIN, the inventor of the famous Iconoscope system of television, has, it seems, discovered a method of "showing up" those members of the microbe family who are responsible, among other things, for influenza and the common cold in the head.

Up to the present these disagreeable mites have managed to dodge the prying eye of the most powerful microscope. They also escape with ease through the pores of the finest filter. Actually they are so small as to be comparable with the wavelength of light itself.

Although full details of Dr. Zworykin's new microscope are not yet to hand, there is no doubt he has been turning the cathode-ray tube on them. High-voltage cathode-ray tubes can be used to generate X-rays—which are much shorter in wavelength than ordinary light—and by producing rays which are tiny even in comparison with the size of the cold-in-the-head microbe, it becomes possible to photograph him for the first time.



Lucerne Coils in the P.W.H. Mascot

AS we have been unable to cope with the requests for altered blueprints to use the Lucerne coils, we have been publishing the more popular receivers week by week.

The Mascot receiver, designed by Percy Harris last year, is a trifle different from the ordinary run of receivers which use Lucerne coils, as it makes use of a bandpass circuit with reaction. We have experimented with two Lucerne coils in place of the original Mascot coils and find that there is a distinct improvement in the selectivity and volume, not counting the wider tuning range.

The connections are different from those in the Lucerne Ranger and other receivers we have published using Lucerne coils. You will want one aerial coil and one grid coil with reaction.

Both coils are mounted vertically and not one vertically and one horizontal, as with the Mascot coils. The terminal marked A on the aerial coil is now not used as the aerial lead-in is taken through a pre-set condenser to the terminal marked G. On the grid coil the terminal marked A is also not used, except when you wish to cut out the bandpass action and use a simple tuned circuit.

We need not give you the actual connections as these are so clearly shown on the blueprint.

For readers in a swamp area it is essential that they use both coils to provide adequate selectivity, but when at a distance from any powerful stations, it may be advisable to use only one coil, as with the Mascot receiver, so as to obtain the maximum volume.

Quarter-scale layout of the Mascot converted for Lucerne coils. Full-size blueprint available, price 1s. post paid (ask for No. AW337a)

The World Listens to the Boat Race

WHETHER you are for the light blues or the dark, you will no doubt be numbered among the millions who eagerly tune-in the B.B.C. stations on Saturday, March 17.

On that day the B.B.C. commentator will follow the progress of one of the nation's annual sporting events—the Boat Race. He will keep you in touch with the crews of Oxford and Cambridge as they strain at their oars all the way down the celebrated course along the Thames.

Trailing the Crews

Already, as we write, the B.B.C. engineers have prepared the good launch *Magician* for its onerous job of trailing the crews along the river.

Down from Henley, the boat lies at Putney ready, equipped with its special short-wave transmitter, padded microphones, aerial and earth.

As at last year's Boat Race, the B.B.C. has

course, connected by land lines to the control room of Broadcasting House. From that point it goes out to all B.B.C. stations, as well as to the Empire via Daventry, and to other parts of the world through various Post Office beams.

Let us take a closer glimpse of the launch arrangements. Right up in the bow is the padded case for the two microphones, one in use and one in reserve—the B.B.C. leaves nothing to chance. This case is covered with tarpaulin to protect the microphones from the wind and spray. The funnel effect of the case, which is tilted upwards, concentrates the commentator's voice without bringing in too much of the noise of the launch's engine.

Nearby sits the commentator, with a clear and unobstructed view of the two rival boats in front of him—they will be about fifty yards ahead in the actual race.

John Snagge will do the commentary, as he did last year. He was something of an oarsman at his University, and knows all the technical terms. Latterly he has been doing special O.B. announcing, although at one time he was a regular London station announcer.

In the stern of the boat is the transmitting apparatus. The rest of the stuff, such as the batteries and rotary converter, is distributed along the bottom of the boat to keep it in good trim.

When the race is on and the launch is following the crews everyone in it has to keep still, for above them is slung the transmitting aerial, and any movement would upset the wavelength adjustment.

This aerial is the usual inverted-L type, slung between two 12-ft. masts, one at each end of the launch. The earth is rather novel, being



Sport and General photo

For last year's Boat Race the launch "Magician" was equipped with special short-wave transmitting apparatus, which will be used again this year

copper sheeting fixed to the keel of the launch. Apparently this makes quite a good earth—good enough, anyway, for the limited radiation needed to reach the receiver.

The wavelength of the launch transmission is kept a secret, for fear that local fans might try to tune it in, oscillate on it, and so spoil the whole broadcast. It is somewhere between 80 and 100 metres.

To keep this wavelength as steady as possible the transmitter is crystal controlled. It is a very modern little equipment.

Power from Batteries

Power for this transmitter has, of course, to be derived from batteries. Even so, they get quite a hefty output. The low-tension is from a 6-volt accumulator, the whole outfit taking 10 amperes.

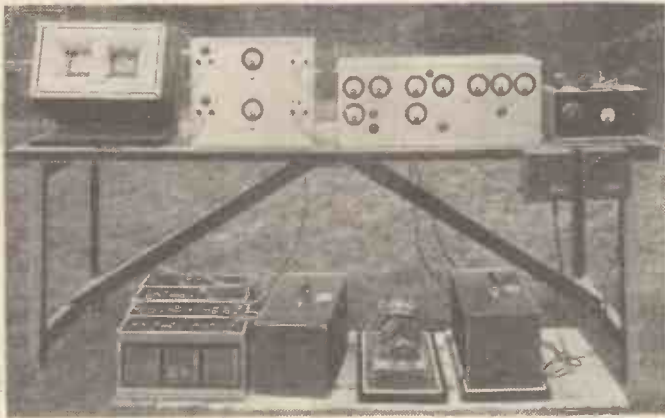
High tension comes from a rotary converter, giving 1,000 volts at 200 milliamperes.

All the gear, including the power supply, weighs about half a ton, so careful distribution of the various parts is essential.

The engineer in charge of the transmitter can check up the outgoing signals by donning headphones-connected to a small receiver.

When you listen on Saturday just think of the complicated chain that makes it possible for you to keep in such close touch with the battling crews on the Thames. It will be surprising if you notice any hitches, though, so smoothly is everything worked out beforehand.

True, you may notice a little fading at times, but that will be when the launch passes under the bridges. As it does so the signals from the short-wave transmitter will be momentarily shielded, but probably John Snagge will take care not to say anything important during these brief spells.



B.B.C. photo

Here is all the apparatus used in the launch "Magician," including the transmitting panels, the rotary converter, and the specially padded box for the two microphones

installed a sufficiently powerful transmitter to keep in contact all through the race with just one receiver.

This receiver, with a stand-by duplicate in case of trouble, is erected on the roof of Harrod's repository, half-way along the course, near Hammersmith Bridge. It is, of

All That's New in Radio This Week

RESearch is being carried out in connection with iron cores for high-frequency coils by the Salford Instrument Co. They are developing a type of Ferrocarr material which will be much stronger mechanically and also to withstand tropical conditions.

The new extension loud-speaker made by Wharfedale has a very attractive cabinet of modern design, being hand-polished in semi-matt finish with chromium-plated fittings. Black or walnut cabinets can be supplied from stock, while mahogany and

fumed oak can be supplied in a matter of two or three days.

The loud-speaker can be matched to high- and low-resistance outputs; terminals are conveniently mounted on the back of the cabinet. A volume control, which includes an on-off switch, is also fitted. This means that the loud-speaker can be switched off or the volume adjusted without leaving the room. The price of this new loud-speaker is £3 19s. 6d.

Several new condensers have been introduced into the Peak range. The electrolytics consist

of 4- and 8-microfarad models with a working voltage of 550, priced at 4s. 6d. and 5s. respectively; 50-microfarad, working voltage 60, priced at 3s. 6d.; and 25-microfarad, working voltage 50, priced at 3s.

The range of type M condensers has been increased. The price of those from .001 microfarad to .0025 microfarad is 9d. each, and from .005 microfarad to .1 microfarad is 1s. each.

It should be noted that the working voltage of the type W aqueous electrolytics has been increased to 500 volts.

Four more new high-tension batteries have been introduced by Ever Ready. These batteries are designed for use with commercial receivers. For the Portadyne model B72 the battery number is W1236; for the Philips model 834B the battery number is W1253; for the Pegasus model 1660, and for the Bush model SBr the battery number is W1227.

For use with the new Marconi and Osram QP21 power valve. Wright and Weare, Etd., are making a special transformer which sells at 13s. 6d.

Criticisms by WHITAKER-WILSON

My Broadcasting Diary



Enid Trevor

Monday

LISTENING to Henry Hall's recital of dance tunes to-night, I came to the conclusion there is only one success in every hundred tunes broadcast. That is not Henry's fault, for he plays them well enough. Simply that the tunes aren't there. I liked "Sad is the Willow," but can't remember a note of it now.

Tuesday

FORTY-MINUTE vaudeville shows are quite a pleasing innovation, especially when they are as good as the one to-night. Charles Brewer is to be congratulated on a snappy little production.

Alec Templeton amused me very much. When he imitated a Wurlitzer organ by playing the piano with one hand, while he sang the "solo stops," he made my heart rejoice. He made all the noises the average cinema organist makes.

Then, again, his imitation of a knob-twister with a cheap wireless set pleased me, but not so much as that of opera at Covent Garden.

An imitator and a satirist at the same time. I hope they won't spoil him by having him too often, but I do suggest he be allowed to appear regularly.

The Carlyle Cousins were in tip-top form. They are fortunate because their particular style of broadcast suits the microphone to perfection. Did one ever hear such rhythm as theirs?

George Buck and Charles Hayes were both very good. The former has a Robeyish quickness of style, and the latter is an admirable reciter. I enjoyed the poem about the mythical Chinese dignitary, Who Flung Mud.

Claude Hulbert and Enid Trevor are always good at any time. In fact, every time. It may be nonsense, but it is very clever nonsense.

The Arcadians first-rate. The humour dates a bit, despite the clever way Leonard Henry and Horace Kenney handled their parts. The music sounded just as fresh and jolly as ever.

Wednesday

SZIGETI created a *fuore* with the Brahms violin concerto. I thought he would. Quite one of the performances of the year thus far.

Thursday

SOMEWHAT puzzled to-night. The St. David's Day broadcast rather bored me, to be quite candid. I am wondering whether it was Welsh enough for the



Claude Hulbert

people of Wales. In places it was too Welsh for the people of England. Another year it might be as well to do the whole thing in Welsh and settle it that way.

Friday

DEBROY SOMMERS and his band play dance tunes so well that I wonder they try to play anything else. Now I come to think of it, I rather object to their trying to play serious music. Why should they? Does anyone ever hear the Catterall String Quartet trying to play "On the Steamer Coming Over"? Then why . . .

The ninth chamber music concert from Broadcasting House was a great success. A fine rendering of the Schubert Octet, one of the most perfect pieces of music for broadcasting.

Saturday

LISTENED to *Tea Mixture* this afternoon. I now wish to make it quite clear to the B.B.C. that I refuse to wait for my tea till half-past four on a Saturday afternoon just to suit their convenience. Four is the hour, not a moment later.

A very good show from the point of view of the fun in it. I didn't think much of the singing.

Teddy Williams, as compère, was really funny. We can do with more of him. Also of Eric Barker, whose imitation of John Tilley was extraordinarily close. Lastly, I enjoyed Myles Clifton and "Pauline." She overdid it slightly, but he was admirable.



Leonard Henry

Listeners' Letters

IN AND OUT

To the Editor, AMATEUR WIRELESS

I HAVE a friend who is rather keen on these blue-shirts, or brown-shirts, or whatever it is. The other evening he called on me. After a while he said, glancing at the clock, "Let's have the news bulletin." Of course, I knew what he was after and switched on the wireless.

There was some very catching music coming through, but after a time it ceased and the news came on. The announcer began talking about these —shirts (I'm not sure of the colour) and I very naturally expected my friend to be tremendously interested.

When the announcer switched over to something else, I passed a remark concerning the news we had just heard.

"What's that?" said my friend. "Why didn't you tell me it was on?" "But you must have heard it!" I said in amazement. "No," he replied, "I was thinking about that music."

This incident led me to the sad reflection that much of what the announcer says literally goes in at one ear and out at the other.

Belfast. WM. NIMMONS. [1037]

THE COST OF COMPONENTS

A WEEK or two ago Percy Harris wrote an article entitled, "Is it Worth While to Build Your Own Set?" and, whilst I entirely agree with his conclusions, one wonders how much longer it will be worth while.

Some years ago, to parody a famous advertisement, I bought a factory-built set, "since when I have used no other" (factory built).

We all know that comparisons are odious, but at times almost essential, and just recently a celebrated firm has produced an all-mains four-valve (five including rectifier) super-het at £12 12s. 0d.

Now, the cost of the A.W. "2 H.F." (battery) Four amounts to £10 3s. 0d. plus loud-speaker, 19s. 6d. (vide Peto-Scott's advertisement), plus, say, 30s. for batteries—a total of £12 12s. 6d.

Theoretically, the mains set should be infinitely more efficient, though I have not had the opportunity of proving this.

"We have been asked by the Commissioner of Police to broadcast 'The Following'"



Now, the "2 H.F." Four is just about as simple and straightforward in design as is possible, but the cost of the components is much too high, due in some cases to their being unnecessarily well finished.

Who needs a beautiful bakelite cover to a low-frequency transformer or choke, when a small terminal strip would do equally well?

Who wants the beautiful external finish to such things as coils, variable condensers, etc., so long as the "innards" are good?

Who wants a beautiful perforated enamelled case to a metal rectifier?

Why are valves so costly?

No, the time has come when makers of components and valves must reduce their prices, otherwise they will find that ultimately, if not very soon, they will "kill the goose," etc.

Incidentally, there is little doubt that what they lose on the swings by reducing prices, they would very quickly make up on the roundabouts.

In conclusion, may I say "Floreat A.W." J. N. G. WILSON. [1038]

AMERICAN RECEPTION

MY set is a battery-operated screen-grid three with a pentode output (home built), with a moving-coil speaker. My aerial is 50 ft. long thrown over my house.

On February 25, between 3 a.m. and 4 a.m., I received five American stations. Two I was able to identify, WCAU and WABC, which came through with very little fading.

I may say I picked up all five stations very easily, but I had to use headphones.

W. K. MOORE. [1039]

By H. CORBISHLEY

AMATEUR TELEVISION

Remedying Faults in Television Pictures

of elimination. In any case, he will not expect perfection, but some of the more obvious defects will present problems to be solved.

Negative Pictures

In some instances the beginner will not be aware that a fault is remediable, whereas in others they will be quite obvious as definite faults. Such, for instance, is the case with a negative picture in which parts that should be white appear black, and vice versa. There are several methods of curing this defect, and which is used must depend upon circumstances. If transformer coupling is used in the receiver then the picture can be reversed by changing over either the primary or secondary connections of the transformer—not both, remember.

This simple expedient is not applicable in the case of resistance-capacity or auto-transformer coupling, so resort must be had to other means. The simplest is to change the type of detection. If leaky-grid detection is used then this should be changed to anode-bend, or if anode-bend is in use, to leaky-grid. Another remedy is to add another stage of amplification, leaving everything else alone.

Mechanical Faults

Probably the next most common fault is a stepped appearance of the image somewhat as shown by Fig. 1. This is more likely to be present in a mirror-drum or mirror-screw receiver than in one of the disc type. In either case, however, it is due to the wrong radial positions of either the mirrors or the holes in the disc. The fault is mechanical and its correction in a disc, if very bad, is impossible, though a certain amount can be done by covering up some of the holes and repunching. Mirrors, in the case of a mirror-screw or drum, are adjustable, and the fault can be corrected by readjustment. The fault can best be observed when any object which has a straight horizontal edge is being transmitted which will have a pronounced step appearance. It may be difficult to recognise in a face and be confused with phase distortion, which is an electrical defect dealt with later.

Another defect, due to incorrect spacing of the holes in the scanning disc or incorrect angular setting of the mirrors of a drum, is revealed by either broad black or white bands being present, as shown by Fig. 2. This means that, in the case of the disc, the holes are not properly positioned radially so that two or more holes are covering the same path as the disc revolves. In the mirror-drum the angles of the mirrors are not right and reflected spots of light are covering the same screen area.

Split Pictures

A picture which is split merely shows that the receiver is running at the same speed as the transmitter but is not in synchronism. The effect may be got rid of by allowing several frames or pictures to travel in one direction or the other, when it will be seen that, as this is being done, the picture gradually moves to one side until finally it is in the correct position at which it should be checked.

The foregoing are mechanical faults, but there are also electrical troubles which are revealed in certain ways and may be very



Fig. 1. A stepped appearance of the picture is due to incorrect positions of the scanning holes or mirrors

WHEN the amateur has built his television receiver and received pictures for the first time, the novelty of it all will cause him to overlook certain shortcomings which in all probability will be present in the picture. A little use of the apparatus, however, and he will begin to appreciate that there are faults which it would appear are capable



Fig. 2.—Broad black or white bands are the result of the radial positions of the holes being wrong



Fig. 3.—Flaring shadows are due to faults in the low-frequency amplifier

puzzling to the beginner. For instance, lack of low-frequency is shown as a light thrown up at the back of an image, and the white background has a black cloud effect as though some heavy clouds were hanging down from the top of the picture (see Fig. 3). In other cases heavy shadows will be present on the forehead or beneath the jaw, the latter often being very noticeable when there is a large

Continued on page 304



Fig. 4.—Heterodyning is seen on the screen as a sort of mesh pattern

AN IDEAL RECEIVER FOR THE BEGINNER—FULL DETAILS IN "TELEVISION"—MONTHLY 1/-

Checking the quality of transmissions in the control room on the eighth floor of Broadcasting House



Keystone photo

REAL QUALITY

The First

It is with pleasure that I accept the article of a new "quality" Editor's invitation by a... Born of musical parents he has been steeped in the art of music. His father was a Doctor of Music at Trinity College of Music and he built an organ building for this...

uniform reproduction of each and every frequency that is produced in the studio, so that the same power or volume is assigned to every note in correct proportion.

This does not mean that the overall volume of the original performance need be exactly reproduced; it *does* mean that all the notes must be relatively the same in strength.

AMATEUR: I think I follow you. If I take a photograph of a house, although the actual size is not reproduced, yet the proportions are there as in the original.

PROFESSOR: An excellent simile! That is just what I mean. Yet in how many wireless sets can it be truthfully claimed that the original proportions are maintained in the

AMATEUR: Good evening, Professor; it is a great pleasure to meet you and have this little chat on wireless. I particularly wanted to see you, as there are a number of questions I wish to ask you if you don't mind my worrying you with them.

PROFESSOR: Fire away! If I can be of any assistance to you, I shall be only too pleased.

Quality and Voltage

AMATEUR: Well now, to start with, I do wish I could get some really satisfactory quality from my set. I have been told that it is not possible to get realistic reproduction from either wireless or gramophone unless one has a very high voltage at one's disposal; say, 400 to 550 volts high tension for the last valve.

If that is so, I'm afraid I shall have to give

special attention to this matter of limited plate voltage to which you refer, and I have at last found a system by which it is possible to get real quality from such sets as people like yourself can afford to build.

AMATEUR: That's real good news!

PROFESSOR: Yes, it is, because the continued appeal of wireless depends very largely on this important issue. Slowly but surely, people are becoming more and more exacting in their demands for realism, and it is very necessary to raise the standard of reproduction to meet these demands.

But before embarking on a discussion of the methods by which real quality may be obtained, don't you think we ought to arrive at some agreement as to what is actually required?

AMATEUR: You mean, what is real quality?

PROFESSOR: Yes. Perhaps you would just let me hear your set first of all, and we can make this a basis for our discussion on quality.

AMATEUR: I am ashamed to turn it on! However, here goes.

PROFESSOR: Humph! What would you say about it yourself?

AMATEUR: It's all wrong!

PROFESSOR: I see you have no illusions about it. You have got a very fair high-note response, and that is not a very common virtue in wireless sets of to-day. Most of them cut off

at about 4,000 cycles, that is, the top note of the piano. Yours goes up to quite 5,000.

AMATEUR: No doubt, though I don't suppose it's a straight-line response up to there.

PROFESSOR: And a good thing it isn't, because your bass register is far too weak in proportion to what sounds above it. I should say that the response is best in the middle and that the strength dies away each end of the musical scale. Here is the kind of response curve you are getting. (He draws a rough sketch on a sheet of paper. See Fig. 1.)

AMATEUR: The ideal curve would be a straight line, would it not?

PROFESSOR: Certainly, if by that expression you mean the reproduction of the actual performance as such. By "straight line" we mean, of course, a



Fig. 3.—This is the kind of frequency-response curve that a good-quality domestic receiver should give

reproduced version? They correspond to photographs (to use your simile) of houses in which the front door reaches half way up the entire wall of the building, and the windows are mere slits; the bricks are of varying sizes instead of being uniform, and the mortar...

AMATEUR: Well? What about the mortar? PROFESSOR: In some places it isn't there at all!

Ears Becoming Critical

AMATEUR: What a house! And what a photographer!

PROFESSOR: Yes; and what a wireless set! In the realm of art it is the same in both cases. The only difference is that the one is discerned by the eye, while the other is discerned by the ear. The eye being far more critical and cultivated than the ear is the more easily offended. But people's ears are gradually becoming more cultivated, as I have mentioned already.

AMATEUR: So you agree with me that my set is not reproducing the proportions of the original. I have realised this for a long time I wish I had a straight-line amplifier.

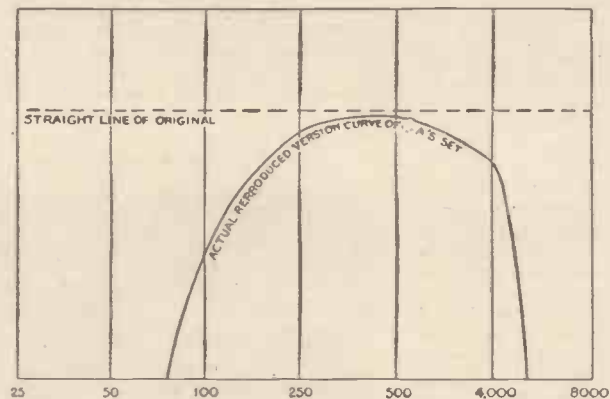


Fig. 1.—Curve of a typical domestic set. Note the falling-off below 250 cycles and above 4,000 cycles

up the idea of real quality, for I simply can't afford to go in for such an expensive eliminator, and I have friends who have D.C. mains and cannot get more than 220 volts at the most, while others have no electric light at all and have to fall back on dry batteries.

Are all these people to forgo the pleasure of listening to a really good quality reproduction of wireless and gramophone? If so, it's very unfortunate. I'm a musician, as you know, and I can't say I am at all satisfied with the tone of my present receiver.

PROFESSOR: You have put your case and that of your friends very clearly. It so happens that the solution of your little problem is by no means impossible. I have been paying

QUALITY and How to Get It

of a New Series by NOEL BONAIVIA-HUNT, M.A.

What we introduce the first "Quality" series, written at the hands of a recognised authority. Noel Bonavia-Hunt has spent his life in the sphere of music all his life. He is a member of the Royal Society of Music and founded the Royal College of Music, London. He has studied music for many years and has written

four standard books on the subject of tone.

In 1921 Noel Bonavia-Hunt turned his attention to wireless and in 1928 demonstrated a special high-quality radio-gramophone in an outside hall during the Radio Exhibition at Olympia which attracted large crowds every day. Since then he has continued his researches on quality reproduction and worked out many improvements



Keystone photo

The piano has an extended frequency range. This photograph is of a B.B.C. accompanist

PROFESSOR: How would that help you?
 AMATEUR: Well, my present amplifier has a curve that shows a rise in the middle, as your sketch makes only too clear. That means a weak bass, a strong middle and a weak treble.

PROFESSOR: I was not aware that the curve I drew was the characteristic frequency-response curve of your amplifier.

AMATEUR: You mean it represents the kind of reproduction my set gives?

PROFESSOR: Exactly. What the loud-speaker is delivering to us listening in this particular room.

AMATEUR: I see. The net result of the complete box of tricks. Still, if I had a straight-line amplifier I should, I am sure, hear a great improvement.

PROFESSOR: For all I know, you may have a straight-line amplifier, as it is. What method of low-frequency coupling have you?

AMATEUR: Resistance - capacity right through, except for the output-transformer which matches the last valve to the loud-speaker.

PROFESSOR: Let me have a peep at it. . . . Yes, it is 'straight line' all right. That's the trouble.

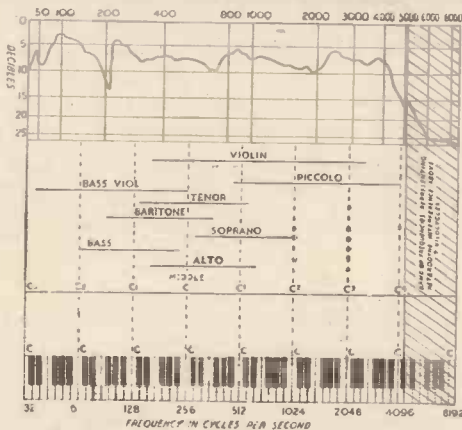
AMATEUR: Why, what do you mean?

Straight-line Amplifier

PROFESSOR: What I say. A straight-line amplifier can only amplify uniformly the frequencies that are introduced to it. If you enlarge a photograph, you can only enlarge what is there; you can't alter the proportions. If, however, the photograph you are asked to enlarge is a bad one with all kinds of defects in it, you have got to enlarge the bad with the good. Now an amplifier with a straight-line characteristic does the same thing with the sounds introduced to it. Being straight line it cannot alter the proportions of those sounds.

AMATEUR: Then the sounds that my amplifier is expected to deal with are not a true copy of the original sounds in the studio?

PROFESSOR: No, they aren't. Quite apart from the problems connected with the microphone, transmission, high-frequency amplification and rectification in the receiver, it is obvious that in a room of this size, which is roughly 18 ft. by 20 ft. and, say, 10 ft. high, you couldn't tolerate an orchestra playing at normal strength or anything like it.



Frequency-response curve of the new Pye New Era super-het receiver

Practically every item except speech has to be adjusted in volume level to suit this particular room and this means that the original proportions have to be altered in order to get the bass, middle and treble registers in correct balance in this room. And in any case your output valve would not stand a big input.

AMATEUR: I understand. I take it that we have our imperfect ears to blame for this difference in proportions when the music is softened down to suit a small room and the capabilities of a small set.

PROFESSOR: That is so. The reduction of the overall effect can never be carried out uniformly in the reproduced version, because the ear responds far more readily to the middle register than to the bass and treble. Perhaps I ought to make it clear that the musical scale is for the purpose of our discussion best divided up into extreme bass, bass, lower middle, upper middle, treble and extreme treble.

The extreme bass register consists of frequencies from 25 to 60 cycles, the bass from 60 to 100, the lower middle from 100 to 250, the upper middle from 250 to 500, the treble from 500 to 4,000, and the extreme treble from 4,000 upwards.

Come to the piano and see exactly how the divisions plan out on the keyboard. The bot-

tom note has a frequency of 27 cycles per second, while the top note has a frequency of 4,096. Actually, the frequencies are a little higher than the figures stated, as this particular piano is, I see, tuned to what is called the New Philharmonic Pitch, which makes the top note 4,176 instead of 4,096, and the other notes would be in proportion, middle C being 261 instead of 256.

Now let us write the frequencies of each note A and each note C in the successive octaves on little slips of paper, and place a slip on each key to denote what its frequency is. (The Professor does so; see Fig. 2.)

Boundaries of the Registers

Now let us place black slips on those keys that mark the boundaries of the different registers. Everything should now be quite clear.

AMATEUR: Quite. What is the actual response curve required for the reduced version of the original sounds?

PROFESSOR: That depends on at least two things. First, the amount of reduction required, which obviously varies somewhat in different people's rooms and to suit differing tastes; and secondly, the type of loud-speaker employed. I need not tell you that loud-speakers vary considerably in their frequency-response characteristics.

AMATEUR: We can take an average specimen of the moving-coil type.

PROFESSOR: Right you are. Well, this gentleman has a good middle register and tails off at top and bottom.

AMATEUR: I am sure mine does.

"Straightening" Frequency Response

PROFESSOR: Then, to get the frequency response straightened up in the reproduced version so as to make it a reasonably fair copy of the original as regards volume level, we shall have to adopt a curve something after this fashion. (The professor draws the curve shown at Fig. 3.)

Your amplifier should be designed to give this particular frequency-response characteristic; then you would find that the reproduction in your room would be extraordinarily improved. But I am afraid my time is up, and I shall have to postpone further discussion of the subject till next week.

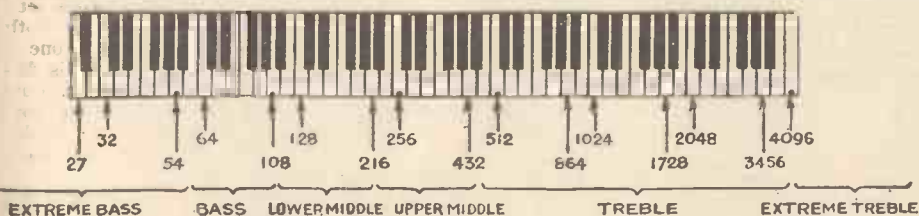


Fig. 2.—How the musical scale is divided into six different registers. The keyboard of the piano makes a convenient "map" for plotting out the divisions



Wide World photo

If you have an aerial you must have a radio licence! Note the unusual frame aeriels on these Post Office "detector" vans

Every set needs an aerial of some kind. Here J. H. REYNER, B.Sc., A.M.I.E.E., discusses actual measurements made on several typical aeriels. His conclusions should help you to get better results

IN these days of highly-efficient receivers little attention is given to the installation of the most vital part, the aerial. A few years ago, when receivers were far from sensitive, the aerial was considered to be the most vital portion. Extreme care was observed and all precautions were taken during the erection.

Increased Signal Strength

Nowadays, more often than not, the aerial consists of an odd length of wire strung along the garden fence or possibly fixed on the linen post. The erection of an AI aerial will quite often give increased signal strength and solve a number of problems, such as lack of selectivity, break-through, etc.

An aerial comprises a wire or system of wires suspended in the air and insulated at the end. Electromagnetic waves on reaching the aerial set up an alternating voltage between the wire (which forms the upper plate of a condenser) and the earth (forming the lower plate).

The voltage induced by the wireless waves depends upon effective height of the aerial. This is the distance between the plates of an equivalent condenser and depends largely on the circumstances.

For instance, if one has an aerial in a confined space, surrounded by buildings, etc., the capacity effect to the buildings is very much greater than if the aerial is entirely in the open, and the effective height is greatly reduced.

Two Demonstration Aeriels

Fig. 1 illustrates two aeriels which were actually rigged up to demonstrate this point. One of these aeriels was 35 ft. long, but ran quite close to the side of the laboratory for a good deal of its length. The actual height at the top end was 15 ft. The other aerial was 25 ft. long, but was run in a relatively clear position with the top end 20 ft. above the ground.

The voltages picked up from the London Regional transmission on a simple aerial circuit, such as is shown in Fig. 2, were 1.0 and 1.6

volts respectively, a 60 per cent. increase in favour of the shorter aerial arranged in a more open position.

The usual form of aerial has a horizontal top for some part of its length. The purpose of this is to increase the effective height slightly, and up to a point this can be utilised very effectively. To demonstrate this the aerial shown in Fig. 3 was fitted up.

This consisted of a 40-ft. length of wire run round three sides of the laboratory at a height of 9 ft. from the ground. Tested under the same conditions this developed a voltage of just over 2, a slightly better result than the vertical aerial outside. It should be remembered, however, that this aerial was well spaced from the walls so that there was little capacity effect.

Reverting to outside aeriels, the length of the horizontal top should not be too great. The curve of Fig. 4 shows the effect of increasing the ratio of horizontal top to vertical height and it will be seen that there is little point in going beyond the position where the two are equal.

On the other hand, from the point of view of selectivity, there is a distinct disadvantage because the longer the aerial is made the greater becomes the natural wavelength—the wavelength to which the aerial system will tune with its own self-inductance and capacity, and if this natural wavelength is anywhere near the waveband being received, the selectivity will be found to be very poor.

The effect of this will be more noticeable on a simple receiver having only a detector or perhaps one high-frequency stage. With a super-het receiver the effect of the aerial is not

so marked but, even so, it pays to take reasonable precautions in these days where selectivity is the crying need.

Where it is possible to run the aerial in one or two alternative positions it will be found helpful to arrange to discriminate against the local stations. Two aeriels were connected up, 100 ft. long and 25 ft. high, as shown in Fig. 5. One of the aeriels was in the plane of the waves (that is, on a line joining the receiving point to Brookman's Park and the other was approximately at right angles).

It was noted that the aerial in the plane of the waves gave about 30 per cent. less pick-up and this would assist in the selectivity of the receiver since stations from other directions would be received at somewhat greater efficiency.

The directional effect is only marked when the horizontal top is fairly long relative to the height and, as we have seen, this is not desirable from other points of view, but if there is any choice available as to the location of the aerial it is as well to bear this point in mind.

We may sum up therefore as follows:

1. Keep the aerial away from trees, roofs and other obstructions, if necessary using spacing rods for the purpose.
2. Keep the horizontal top fairly short—about equal to the vertical height, for preference. If practicable, arrange this horizontal top to run away from the direction of the local station.
3. Make sure that the aerial is efficiently insulated.

A final point to be remembered is that when an aerial is erected in towns or cities where a large amount of smoke and grime is present in the air, a periodical clean-up of the insulators and lead-in joints will often result in improved signal strength.

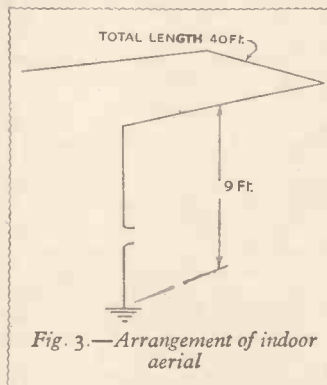


Fig. 3.—Arrangement of indoor aerial

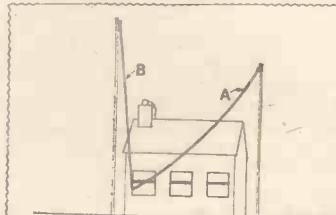


Fig. 1.—Two demonstration aeriels

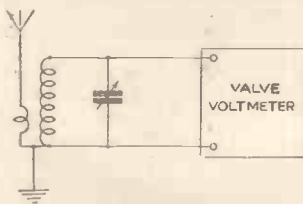


Fig. 2.—Voltages are measured on a valve voltmeter

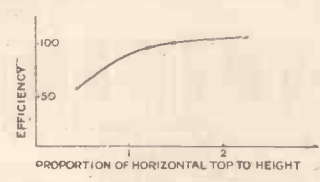


Fig. 4.—Curve showing efficiency as the amount of horizontal top approaches the vertical height

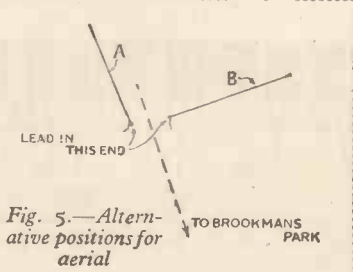


Fig. 5.—Alternative positions for aerial

QUARTZ Is a Vital Factor in Radio NOW!

Quartz crystals are now playing an important part in radio work, both at the transmitting and the receiving ends. In this article PERCY W. HARRIS, M.INST.RAD.E. explains how the quartz crystal is used—and its future possibilities

NOT everyone agrees that modern scientific progress has brought with it a corresponding mental development. At heart we all seem very much the same as we used to be—temporarily startled, maybe, by the new, but accepting it very readily as matter-of-fact. Indeed, so many startling and, at first, incredible discoveries are made that we are in danger of accepting anything without question.

This may seem remote from wireless, yet my thoughts were turned in such a direction the other day by reading about the prosecution

basis the ability to arrive at and maintain with great accuracy the exact frequency of a transmitter. Accurate wave-meters have been available for some years, but until comparatively recently, no station engineer could guarantee to maintain the frequency of his station within 1,000 or 2,000 cycles; for, while the frequency of a circuit is rigidly determined by its capacity and inductance, and while we can design coils and condensers with great accuracy, the equivalent capacity and other effects of the valve connected to the circuit vary from time to time.

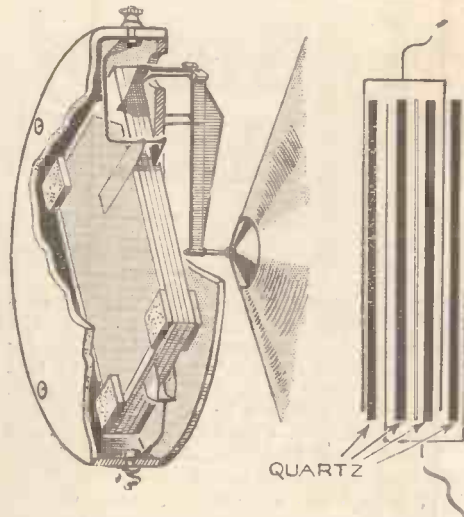
Then one day certain observed qualities of quartz crystal were studied in relation to wireless and a very remarkable new application made of them. A crystal of quartz cut in a certain way and placed between two plates of a condenser, will be found actually to vibrate when a certain radio-frequency is applied to that condenser, the vibration being so intense that if the high-frequency current applied to the condenser is of sufficient strength, the crystal will actually disrupt and fly into small pieces. If placed in parallel with the tuning condenser of a circuit, it practically short-circuits this condenser when it resonates.

The exact frequency at which the crystal will resonate is always the same for the same piece of crystal at the same temperature, and is determined by the geometric dimensions of the crystal. This being so, we can grind the crystal to a certain frequency—the smaller the crystal the higher the frequency.

An application of this phenomenon immediately suggests itself for wavemeters. If, for example, we have a transmitting station which has been allotted a frequency of one million (300 metres) we can grind a crystal of this frequency, place it in a suitable way in a wavemeter circuit and determine exactly whether our station is on or off that frequency. We cannot alter the frequency of the crystal, and the wavemeter will only respond to that particular frequency, but we can have a number of calibrated crystals for different wavelengths and use these for maintaining the accuracy and calibration of a variable wavelength meter.

The next step is to design an oscillating circuit which, by virtue of the control exercised by the magic quartz, will only oscillate at the frequency of that quartz. There are a number of ways of doing this and you will understand that once we have a circuit, the frequency of which is controlled by this crystal, we can do a great deal with it.

For example, as a small crystal of quartz cannot "hold down" by itself a



Arrangement of quartz plates in the new Rothermel piezo-electric loud-speaker

transmitting circuit using a great deal of power, we can first of all use it rigidly to maintain the frequency of a very low-powered circuit and subsequently pass this controlled frequency to an amplifier circuit, thereby raising the power utilised. Further amplification can then take place, till finally we are handling sufficient power for the most mighty broadcast transmitter.

Quartz-controlled Transmitters

Thousands of wireless transmitters are now "quartz-controlled" and where a very great degree of accuracy is required, the exact temperature of the chamber containing the controlling quartz is strictly maintained by a device known as a thermostat. The electrical heating apparatus in this is controlled by a thermometer and as soon as the temperature reaches the desired figure, the current of the heating circuit is switched off.

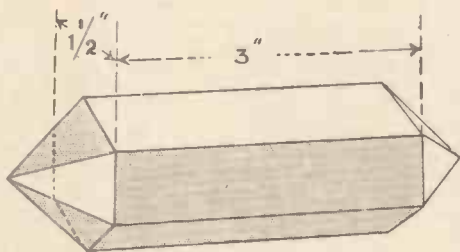
When the thermometer drops below the desired figure, the heaters are switched on again and in this way a constant degree of temperature is maintained and, therefore, the constancy of the frequency is assured.

Quartz-control is not the only method used nowadays for maintaining the exact frequency of broadcasting stations. The British stations have rather favoured the electrically-maintained tuning-fork method. This method is based on the fact that the mechanical vibrations of a tuning-fork which occur at an audible and, therefore, comparatively low, frequency are dead constant, provided we maintain the temperature constant.

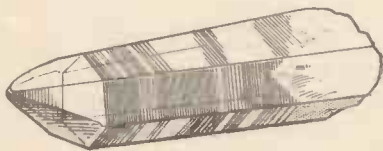
Let us assume for the moment that the frequency of the fork is 1,000 cycles. This, of course, is much too low for controlling any wireless transmitter and if we wish to use it for controlling the previously mentioned million-cycle station, we must multiply this frequency by 1,000.

One method of doing this is to cause the tuning-fork to control a circuit rich in harmonics or multiples of the fundamental frequency, a high harmonic of this circuit

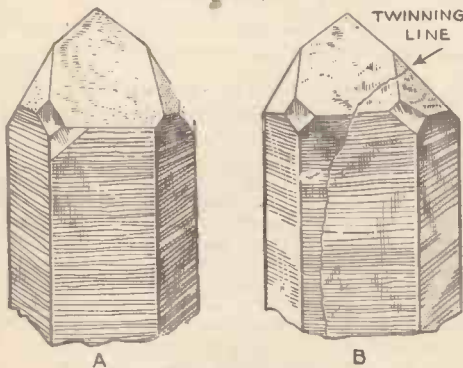
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Perfect example of a quartz crystal; this has to be specially cut for radio work



A good quartz crystal in its common, incomplete form

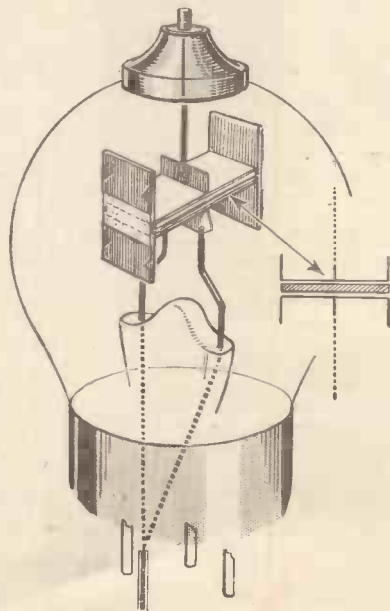


A shows a good crystal with facets on alternate corners; B, "twinned" crystal with facets on adjacent corners

of a fortune-teller to whom confiding women brought their troubles and paid handsomely for the advice she gave. The implement of her trade was a ball of rock crystal, into which she gazed, and told of what she saw.

To attempt to solve one's problems by gazing into a ball of crystal may appear to some of us a fruitless task, yet this very substance is, at present, playing a very important part in solving the etheric chaos not only of Europe, but of the whole radio world.

If any scheme for the re-arrangement of wavelengths is to succeed, it must have as its



Oscillating crystal mounted in an evacuated bulb, something like a valve in appearance

My Test of the 1934 A.C. Century Super

By L. A. CHAPMAN

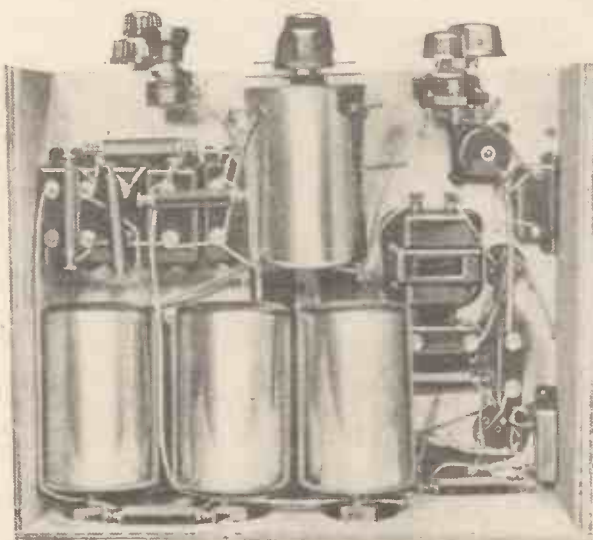
WHEN the Editor asked me to take home, test, and report upon the working of the 1934 A.C. Century Super, I don't mind admitting that at first I thought I was in for an uninteresting time.

You see, I am already the owner of one of the original A.C. Century Super sets which I have brought up to date from time to time, and I did not expect that the latest set would show any marked superiority over the old receiver.

"Counting One's Chicks . . ."

It says something for the new set, then, when I say that I felt somewhat like a child who had just learned the wisdom of the tag about "counting one's chicks before they are hatched." The 1934 A.C. Century Super certainly was an eye-opener to me, and whilst I will not attempt to weary you with a list of stations I received I will endeavour to give a few comparisons.

First of all, my old set operates from a frame



An under-chassis view of the 1934 A.C. Century Super—a set that gives really excellent results

aerial, whilst the new set is designed for use with an outdoor aerial. This, in itself, means extra power and more stations. Further, the new set has two variable-mu intermediate-frequency stages, whereas my old set has ordinary screen-grid valves.

Self-adjusting Volume Control

I have a Westector system of self-adjusting volume control, whilst the new set incorporates a double-diode-triode for second detection and A.V.C. One great advantage of this double-diode-triode valve is that it gives a good stage gain of low-frequency amplification, after second detection, as compared with the old set. Add to this the amplification of the output stage, and we have accounted for the terrific power which it is possible to obtain even from distant foreign stations with the new set.

Finally, although it is the first valve in the receiver, the screen-grid first-detector valve makes a far more sensitive detector than the ordinary triode first detector valve of my old

set. Thus, although there are only six valves in each receiver (not counting the mains rectifier) the new set gives, in results, the equivalent of about what eight valves would give if used in the old circuit.

As an example, I am in the habit of receiving such stations as Fécamp, Toulouse, Hamburg, Mühlacker, Rome and Milan at comfortable strength on the loud-speaker. On the new set it is necessary considerably to tone them down on the manual volume control to keep their strength compatible with what is required for a normal living-room.

Just to see what the result would be however, I decided to put on Mühlacker at full power. No, not a trace of distortion, as I had secretly hoped there would be! Every note of the music was true and my loud-speaker—a large mains-energised model—seemed to relish having something to do.

Not to be beaten, I tuned in London Regional and again set the controls for fullest possible power. Still no trace of distortion.

After a few minutes, however, I seemed to hear something not altogether unfamiliar super-imposed upon the sounds from the loud-speaker and, upon toning down, discovered I had disturbed rather a small member of my family.

I was therefore prevented from going to even farther limits in an endeavour to find fault in this direction.

I therefore contented myself with going the rounds of some of the more popular Continental stations and noting whether the ganging of the band-pass circuits varied or required variation to ensure best results at either end of the tuning-condenser scales.

Even here I was doomed to disappointment, for the ganging remained substantially accurate over the whole of the tuning condenser range!

Lastly, I settled down to test out the efficiency of the self-adjusting volume control. I tuned in Midland Regional, a station which is always heterodyned in my locality and really does suffer from fading. I manage to keep it fairly constant with my own arrangement of A.V.C., but there are times when the distortion so produced makes listening to the station not worth while. It was much better on the new set.

During a period of about half an hour's listening I came to the conclusion that a receiver with an outdoor aerial and band-pass aerial tuning, and with a double-diode-triode embracing A.V.C.—the 1934 A.C. Century Super, in fact—is the only one that will enable me to obviate those difficulties which I have previously considered to be necessary evils in connection with wireless reception in my locality.

It goes against the grain to part with an old friend, but I have already learned in the hard school of experience that sympathy and energy are wasted when used to combat a definite advance such as represented by this new design.

Quartz Is a Vital Factor in Radio Now!

Continued from page 293

again made to control another circuit once ~~being~~ more rich in harmonics, and so on, until we have effected the necessary frequency multiplication.

By both the quartz and the tuning-fork methods it is now possible to maintain the accuracy of transmitting stations with such precision that variations of more than 50 cycles either side of the determined frequency need not occur.

The actual sharpness of tuning of a quartz crystal is amazing, a variation of a few cycles either side of its actual frequency putting it right off resonance.

A few years ago I did a great deal of experimental work in the use of quartz crystals for reception of wireless signals at a time when it was universally thought that a quartz crystal was far too sharply tuned and far too feebly damped to enable telephony, with its wide range of modulation frequencies, to be received.

Telephony Transmissions

The band of frequencies required for the satisfactory reception of telephony is held to be at least 10,000 cycles wide (5,000 on each side of the carrier frequency so as to include the necessary sidebands) and as a comparatively few cycles change of frequency takes a quartz crystal completely off resonance the possibility of transmitting telephony through this extremely sharp "crevice" was scoffed at.

My experiments showed that while the quartz crystal brought about very severe attenuation of the sideband frequencies, this attenuation follows a definite law. Thus, when a modulation frequency of, say, 1,000 was attenuated to a certain degree, 2,000 was attenuated to twice that, 4,000 four times that and so forth.

By designing an amplifier to follow the inverse law, this falling-off could be exactly compensated for, giving first-class telephony quality.

As a quartz crystal is fixed in its frequency and as in a wireless receiver we want to receive any station over a wide band of frequencies at will, it appears at first sight that a quartz-crystal receiver will only receive one station, but by utilising the super-heterodyne method I can assure you it gives far sharper tuning than any other known method.

There have been certain practical difficulties in the development of these sets, but they should be available before long.

Credulity of Scientists

I have often written about the credulity of scientists and how they seem to resent the introduction of novelties which do not fit in with their preconceived ideas. This question of the use of quartz-crystals in receivers brought about a great controversy and considerable acrimony in certain quarters. I had many tussles myself.

For example, it was a known fact that the quartz crystal was extremely sharp in tuning and appeared to pass only a very narrow band of frequencies; it was also agreed that satisfactory telephony required a wide band of frequencies; therefore, said the scientists, one cannot possibly receive telephony of satisfactory quality through a quartz crystal.

Having in my laboratory produced such a receiver, I informed my scientist friends that there must be something wrong with their theory.

Four years have passed since these discussions and, strange as it may seem to you, in spite of the arguments to the contrary and the "proof" adduced that the sideband theory made the reception of good quality telephony through quartz-crystal impossible, it has been found practicable to reconcile the sideband theory with the quartz reception of telephony—at least to the satisfaction of those people who were at first so completely sceptical!

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On the Short Waves

By
**KENNETH
JOWERS**

WHILE many broadcast listeners sneer at the short waves because they say that they are unreliable, I have frequent proof that *under the right conditions* short waves can be perfectly reliable.

As an example of what I am trying to prove, I would like to draw your attention to the successful short-wave transmission that marked the opening of the Australian Radio and Electrical Exhibition.

F. J. Philips, son of the famous Doctor A. F. Philips, founder of the Philips Company, spoke from Philips House, London, to an audience gathered together in Sydney, Australia, through a microphone mounted on his desk in the office. His message went via telephone to Rugby, and was then transmitted on 28 metres direct to Australia.

A. den Hertog, chairman of the Australian Radio and Electrical Exhibition, replied from Sydney via the Post Office receiving station at Baldock, Herts.

Clearly Heard in London

His message was clearly heard through loud-speakers and headphones at Philips House.

Every day of the week the Baldock receiving station is picking up messages from Japan and liners from all parts of the world. Telephone conversations from South America and Australia are as common to them as a local or trunk call is to us.

These transmissions from all over the world—eight or ten thousand miles away—are picked up as reliably as many people get their local station.

Of course, I know that special apparatus is used for this reception, but then the volume they get is simply colossal.

Even though they are using this special apparatus, they are only doing what anyone

can do at less volume with a smaller set.

What the small set misses as a rule is the automatic-volume controlling, and the ability to get one station on several channels at once.

But a listener who is really interested in short waves and takes the trouble to design his apparatus in a thorough way does get results comparable with the wonderful Post Office reception.

I have before me a card from Jack Wilson, of Lanarkshire, Scotland. He logs such stations as W2NG, a second district American station, and W2COJ, which was having a two-way conversation with K4SA, of Porto Rico, Philippine Isles.

He also heard VE3HC and VE1EJ, both of Canada. Altogether this amateur got twenty-one American stations in one evening, some of them up to strength R8.

He logged W2COJ working duplex with W3UD, signal strength being R9—full strength on the loud-speaker. These were both on the 80-metre band and reception was unusually good.

Another remarkable part of his log is the reception of OH2NE, Finland, on both 20 and 80 metres.

I have received far more reports from Scotland than from England lately. In fact, I have not received a good report from anywhere south of London for quite a time.

Can it be that conditions in Scotland are much better than down here—or are the canny Scots more active just now?

Since the death of F. T. Carter, quite a number of readers are writing in to know where they can buy the "Radio Amateur Call Book." I suggest they write to the Radio



F. J. Philips, son of the founder of Philips Lamps, Ltd., speaks from London to an audience in Sydney on the occasion of the opening of the Australian Radio and Electrical Exhibition. The transmission was made on 28 metres

Society of Great Britain. They can get one from these people, the price being about six shillings, varying a trifle according to the rate of exchange.

By the way, this booklet is invaluable to short-wave fans. It gives practically every short-wave station in the world, as well as international prefixes, direction-finding stations, and many other interesting facts of absorbing interest to the keen fan.

Now that the B.E.R.U. contest is over I shall shortly be able to tell you the results. I am specially interested to see how the lady competitors have fared, particularly G2YL.



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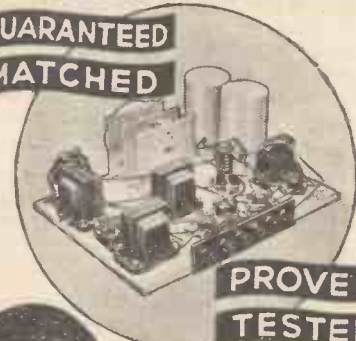
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LUCERNE AERIAL COIL AND GRID COIL Per Pair

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Described in last week's issue.

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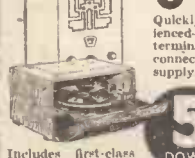
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If W.B. P.M.4A Speaker required, add £2/2/0 to Cash or C.O.D. Prices and 3/9 to each monthly payment.

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Let "A.W." Solve Your Wireless Problems

H.M.V. Greenwich Super-het

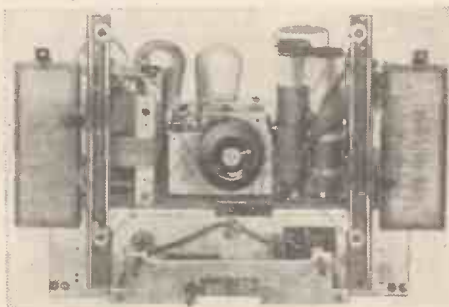
SETS made by H.M.V. have always been renowned for their outstanding design. The Greenwich Super Selective Five, if anything, exceeds the standard set by previous models of this type of receiver. It is a five-valve super-het for A.C. mains only, and is housed in a table type of walnut cabinet which has been designed to give the best reproduction, without boom or resonance. It is 16 in. in height, a trifle over 18 in. in width, and less than 11 in. deep.

The receiver is the conventional five-valve super-het, with a few typical H.M.V. refinements. The first valve is a combined oscillator detector and, owing to the special method of cathode coupling which isolates the aerial circuit from all oscillations, it is entirely non-radiating.

The single intermediate-frequency stage uses a variable-mu screen-grid valve, which is coupled by means of a bandpass coil designed to give a separation of about 9 kilocycles. The intermediate frequency is 125 kilocycles.

No Second Channel

In order to preserve the quality, a power-grid detector is used; this is coupled to a power pentode by means of a special low-frequency circuit which ensures good high-note reproduction, while at the same time eliminating heterodyne whistles. Although the receiver does not make use of a pre-first detector high-frequency stage, there is no image or second-channel interference.



View of the chassis, which clearly shows the separate tuning scales for medium and long waves

An image suppressor has been incorporated which operates on both the long and medium waves and so for the first time second-channel interference has been eliminated in a five-valve super-het.

The external appearance is quiet and dignified, as one expects with H.M.V. cabinet work. There are four control knobs—on the extreme left a special volume control which is graduated and so arranged that it makes overloading almost an impossibility. A feature that we like very much indeed is that there is not a critical setting for this control. Furthermore, should the local or any other powerful stations be tuned in accidentally, volume is held down to a reasonable level.

Useful Tone Control

The second knob is a tone control, which enables the higher frequencies to be cut off when not required. This is particularly useful with gramophone records or when heterodyne whistles are interfering with the programme. Tuning is by a single knob which causes the pointers to move up and down over the long- or medium-wave tuning scale as required.

The main control set governs medium- and long-wave reception, switches in the gramophone pick-up and, when necessary, isolates the receiver from the mains. The wavelength

IN A NUTSHELL

Makers: The Gramophone Company, Ltd.

Model: 439, Greenwich Super-het.

Price: £16 10s.

Valve Specification: Screen-grid combined oscillator/detector (Marconi MS4B), variable-mu intermediate-frequency amplifier (Marconi VMS4), power-grid detector (Marconi MH4), and power pentode output (Marconi MPT4).

Power Supply: 200-250 volts A.C., 50-100 cycles. Other voltages and frequencies to order.

Type: Self-contained table model with an electric clock as an integral feature.

Remarks: A quality receiver that can be made completely portable.

scales, which are lettered vertically, are calibrated in station names and wavelengths between 200 to 550 metres and 1,000 to 2,000 metres. Whichever tuning scale is in use is automatically illuminated so that the tuning is quite a simple matter.

As the receiver is entirely self-contained, including an energised moving-coil loud-speaker, it is entirely transportable as the principle Continental stations can be received with the mains aerial attachment.

Cost of Working

The consumption from the mains is approximately 65 watts, equivalent to the consumption of a standard lamp. This means that you get approximately seventeen hours use for one unit.

The built-in electric clock, as well as being ornamental, is useful. When we first put the receiver on test we started the clock to the "six pips" from Greenwich. After one week's working we checked the time again against the Greenwich pips, when we found that it was dead accurate. It will only keep time on synchronised mains, of course.

On test we found it was quite unnecessary to use an external aerial; 20 ft. of single flex looped around the picture rail was sufficient to bring in over fifty stations at good strength. It is hardly fair to test the receiver on such a poor aerial, particularly as the set is forty miles from a broadcast station, so we used a 50-ft. external aerial. The only difference we noticed was that the daylight range was improved, while the background noise was reduced to an inaudible level.

Altogether seventy stations were tuned-in on the medium waveband, with a minimum of twelve on the long waveband.



Operation of the H.M.V. Greenwich Super-het is simplicity itself

IF your set crackles and bangs like a friendly argument in Chicago

don't be puzzled find out why

The easiest way to solve that problem—or any other radio problem—is to use a PIFCO Trouble Tracker. Just get one of these wonder instruments on the trail and even the most complex radio fault will hold up its hands and surrender. The PIFCO Trouble Trackers show the shortest way to 100% radio reception. Ask your dealer or electrician for a demonstration of a PIFCO.



● PIFCO "ALL-IN-ONE" RADIOMETER (above). For battery sets. Makes any test in a few seconds. Mottled bakelite case. Complete with leads. Price 12/6.

● PIFCO DE LUXE "ALL-IN-ONE" RADIOMETER, Moving Coil model, 125,000 ohms resistance. Tests everything. For electric radio, mains units, or battery sets. Finished mottled bakelite, complete with leads and case. Price £2 2s.

● PIFCO ROTAMETER (right). A radio testing instrument on entirely new principles. One needle operates on 8 separate dials. For electric or battery sets. Amazingly handy and accurate. No other instrument in the world like it. In black bakelite, complete with leads. Price 29/6.



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2. Supply Mains.
3. External.

Atmospheric troubles are usually static, and cannot be eliminated by means of condensers.

In the case of No. 2, trouble may be experienced through the interference being conveyed over the Supply Authorities' distribution system.

In the case of No. 3, external interference, this is caused by direct radiation and originates in electric motors, vacuum cleaners, and any other electrical apparatus in which sparking takes place during operation—for example, violet-ray apparatus, or even when switching on or off any kind of electrical plant.

In attempting to overcome such interference it is necessary to try the application of the remedy at the source.

In many cases the use of condensers alone is sufficient to minimise very largely, and often entirely suppress, the interference.

The Condensers employed must be suitably designed for the working conditions, and should have a 5-ampere fuse inserted between the mains and the condensers.

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A.W. 17.3.34

Record Reviews

By WHITAKER-WILSON

THE House of Columbia seems fairly lively this month. Some attractive issues. I am taking them in the order in which I happened to hear them.

Layton and Johnstone are responsible for "Lullaby Lady" and "Louisiana Hayride," both of which are in their best style. Those two can always be relied upon for a finished production. DB1312.

A more serious record is a remarkable reproduction of the overture to Smetana's *Bartered Bride*, with Sir Hamilton Harty and the London Philharmonic Orchestra. By comparison with the foregoing, it is, of course, serious; but the music is really very light and melodious. Well worth while. DX562.

Fine "Prince Igor" Record

Walton O'Donnell and the Wireless Military Band produce "Prince Igor." This is a fine record, and the recording appealed to me as being above even Columbia's standard. DX564.

Albert Sandler also appears in the list. He plays "The Child and His Dancing Doll" and "Spanish Serenade." If I say it sounds just like him on a Sunday evening and give you the number, that ought to be enough. DB1307.

A couple of fox-trots: "Shanghai Lil" and "You Gotta Be a Football Hero," with Bernie and his lads, and "Devil's Holiday," played by Benny Carter and His Club Harlem Orchestra, CB696 and 698 respectively.

Bing Crosby, on a Brunswick disc, is as you would expect to find him in "Blue Prelude" and a delightful effusion called "I've Got to Pass Your House to Get to My House." For all I know, the latter may be popular and familiar to you. It is my first hearing. The number is 01577.

Two light records, both exceedingly attractive, are numbers 01681 and 01682. Titles: "East St. Louis Toddle-oo," "Baby When You Ain't There," and (this is Earl Hines and orchestra) "Bubbling Over" and "I Want a Lot of Love."

Two Decca discs arrested my attention. "I Wanna Meander with Miranda" rather tickled my fancy (F3819) and also one of Hal Kemp's records called "Living in Doubt" (3604).

Do You Want a "Paul Jones" ?

Are you in want of a really good "Paul Jones"? One of the best I have ever heard is by Roy Fox on Decca K716. While the dancing season is still with us, I think this record will be in demand.

I haven't room to give you a list of all the tunes in it, but they appealed to me as being an extraordinarily good mixture.

Regal has produced another splendid Café Colette record. "C'est une joie qui monte monte" is tip-top. There is something about this orchestra that makes its records and broadcasting worth while. I should like you to try this. You can have it on R1702.

Scott and Sullivan are attractive duettists. They are worth hearing in "At the End of the Day" and also "Roll on Blue Moon," which pleased me considerably. MR1186 is the number. MR1185 produces "The Old Rugged Cross" and "Throw Out the Lifeline," by the Singing Mountaineers.

There is a splendid Ronald Frankau record on Parlophone R1661. "Nineteen Dirty Three" amused me intensely.

A good double-sider by Czegledy and his Hungarian Orchestra, on R1741, called "Faithful Vienna," is quite one of the most pleasing records of this type I have heard for some time.

If you want a really good operatic record, ask to hear the Garden Scene from Gounod's *Faust* on R1736.

NO CLAIMS THIS TIME!

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Balances aerial with selected stations.

Reduces mush. Stops whistle interference.

Counters earth lead noises.

Makes a splendid mains aerial.

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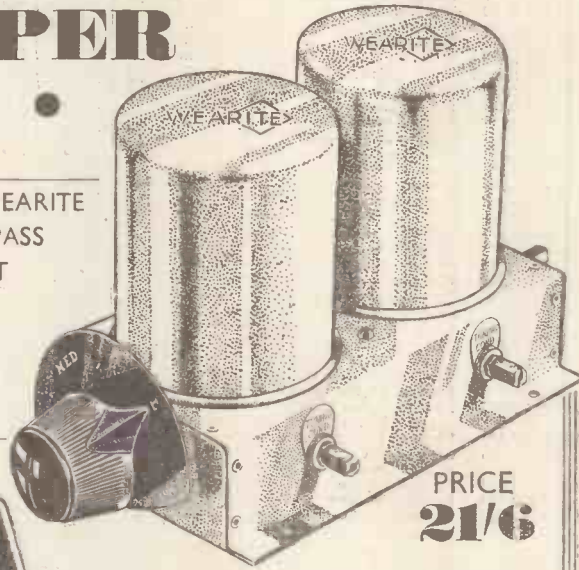
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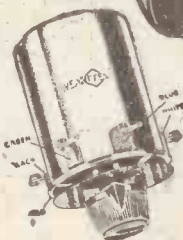
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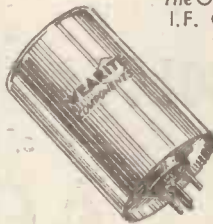
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TYPE G.N.2

PRICE 21/6



The O2 Oscillator

The O.T.I. I.F. Coil



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- One Wearite Oscillator Coil (Type O2), 18/6
- Three Wearite I.F. Coils (Type OTI), 7/6 each

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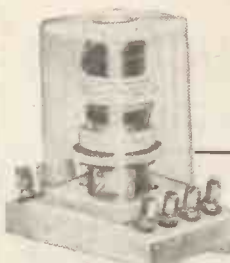
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Medium-wave Broadcasters

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201.1	1,492	Bordeaux-Sud-Ouest	France	.3	269.5	1,113	Kosice	Czechoslovakia	2.5	368.6	814	Milan	Italy	50
203.5	1,474	Plymouth	Great Britain	.3	271.7	1,104	Naples	Italy	1.5	373.1	804	Scottish Regional	Great Britain	50
203.5	1,474	Bournemouth	Great Britain	.1	271.7	1,104	Madona	Latvia	15.0	377.4	795	Lwow	Poland	21.5
204.8	1,465	Pecs	Hungary	1.25	272.9	1,099.5	Madrid EAJ7	Spain	3.0	377.4	795	Barcelona (EAJ1)	Spain	8
206	1,456	Fecamp	France	20.0	276.2	1,086	Falun	Sweden	.5	382.2	785	Leipzig	Germany	120
207.1	1,448.5	Agen	France	.5	277.1	1,082.6	Magyarovar	Hungary	1.25	386.6	776	Toulouse PTT	France	7
208.8	1,438	Miskolez	Hungary	1.25	277.2	1,082	Zagreb	Yugoslavia	.75	391.1	767	Midland Regional	Great Britain	25
209.5	1,432	Beziers	France	1.5	278.6	1,077	Bordeaux PTT	France	13	395.8	758	Katowice	Poland	16
209.9	1,429	Newcastle	Great Britain	.1	280.9	1,068	Tirapol	U.S.S.R.	10	400.5	749	Marseilles PTT	France	2.5
211.3	1,420	Tampere	Finland	1.2	283.3	1,059	Bari	Italy	20	402.7	745	Paredo	Portugal	5.0
215	1,395.4	Radio Lyon	France	.7	285.7	1,050	Scottish National	Great Britain	50	405.4	740	Munich	Germany	100
218.2	1,375	Basle, Berne	Switzerland	.5	288.6	1,040	Leningrad (2)	U.S.S.R.	100	410.4	731	Seville	Spain	1.5
221.1	1,357	Turin (2)	Italy	2	288.6	1,040	Rennes PTT	France	1.3	410.4	731	Tallinn	Estonia	11
221.3	1,355.1	Vitus, Paris	France	.1	291	1,031	Heilsberg	Germany	60	410.4	731	Madrid (Espana)	Spain	1.0
222	1,351	Dublin (2)	Irish Free State	1.2	291	1,031	Paredo	Portugal	5.0	415.5	722	Kiev	U.S.S.R.	36
222.6	1,348	Koenigsberg	Germany	.5	294.6	1,018	Barcelona (EAJ15)	Spain	2.0	420.8	713	Rome	Italy	50
222.6	1,348	Milan Vigentino (2)	Italy	7	296.2	1,013	North National	Great Britain	50	426.1	704	Stockholm	Sweden	55
224	1,339	Montpellier	France	.8	298.8	1,004	Beltrava	Czechoslovakia	14	431.7	695	Paris PTT	France	7
224.1	1,338.8	Lodz	Poland	1.7	301.5	995	Hilversum (Huizen prog.)	Holland	20	437.3	686	Belgrade	Yugoslavia	2.8
225.6	1,330	Hamburg relays	Germany	1.5						443.1	677	Sottens	Switzerland	25
227.1	1,321	Magyarovar	Hungary	1.25	304.3	986	Genoa	Italy	10	449.1	668	North Regional	Great Britain	50
230.2	1,303	Danzig	Germany	.5	304.3	986	Cracow	Poland	1.7	455.9	658	Langenberg	Germany	60
231.8	1,294	Linz	Austria	.5	307.1	977	West Regional	Great Britain	50	463	648	Lyons PTT	France	15
231.8	1,294	Salzburg	Austria	.5	309.9	968	Grenoble PTT	France	3.0	470.2	638	Prague (1)	Czechoslovakia	120
231.8	1,294	Klagenfurt	Austria	.5	312.8	959	Poste Parisien, Paris	France	60	476.9	629	Trondheim	Norway	1.2
233.5	1,285	Aberdeen	Great Britain	.1	315.8	950	Breslau	Germany	60	483.9	620	Brussels (1)	Belgium	15
236.8	1,267	Nurnberg	Germany	2	318.8	941	Algiers	North Africa	13	491.8	610	Florence	Italy	20
238.5	1,258	San Sebastian (EAJ8)	Spain	.6	318.8	941	Goeteborg	Sweden	10	499.2	601	Sundsvall	Sweden	10
240.2	1,249	Juan-Les-Pins	France	2.0	325.4	922	Brussels (2)	Belgium	15	499.2	601	Rabat	Morocco	6
241.9	1,240	Cork	Irish Free State	.1	325.4	922	Brno	Czechoslovakia	35	506.7	592	Vienna	Austria	100
243.7	1,231	Gleiwitz	Germany	.5	328.6	913	Limoges PTT	France	.7	514.4	583.2	Riga	Latvia	15
245.5	1,222	Trieste	Italy	10	331.9	904	Hamburg	Germany	100	522.9	574	Muhlacker	Germany	100
247.2	1,213	Lille PTT	France	1.4	335.2	895	Radio Toulouse	France	8	531	565	Athlone	Irish Free State	60
249.2	1,204	Prague Strasnice (2)	Czechoslovakia	3	335.2	895	Helsinki	Finland	10	539.6	556	Beromunster	Switzerland	60
251	1,195	Frankfurt - am - Main and relays	Germany	17	338.6	886	Graz	Austria	7	549.5	546	Budapest	Hungary	120
253.2	1,185	Kharkov (2)	U.S.S.R.	35	342.1	877	London Regional	Great Britain	50	559.7	536	Wilno	Poland	16
255.1	1,176	Copenhagen	Denmark	10.0	345.6	868	Poznan	Poland	17.0	569.3	527	Vilpuri	Finland	13.0
257.1	1,167	Monte Ceneri	Switzerland	15	349.2	859	Strasbourg	France	15	569.3	527	Ljubljana	Yugoslavia	7
259.1	1,158	Moravska-Ostrava	Czechoslovakia	11	305.7	855.3	Porsgrund	Norway	25	578	519	Innsbruck	Austria	5
261.1	1,149	London National	Great Britain	50	352.9	850	Bergen	Norway	1	578	519	Hamar	Norway	7
261.1	1,149	West National	Great Britain	50	352.9	850	Valencia	Spain	3.0	696	431	Oulu	Finland	1.2
263.2	1,140	Turin (1)	Italy	7	356.7	841	Berlin	Germany	100	726	413.5	Boden	Sweden	.6
265.3	1,131	Hoerby	Sweden	10	360.6	832	Moscow (4)	U.S.S.R.	100	748	401	Gneva	Switzerland	1.5
267.4	1,122	Belfast	N. Ireland	1	362.7	827.2	Radio LL, Paris	France	1.2	748	401	Moscow	U.S.S.R.	20.0
267.5	1,121.7	Nyiregyhaza	Hungary	6.25	364.5	823	Bucharest	Roumania	12	765	392	Ostersund	Sweden	.6
										840	357	Budapest (II)	Hungary	3.0

NOTE:—The following wavelengths are common to several transmitters: 206 m. (1,455 kcs.); 207.3 m. (1,447 kcs.); 208.6 m. (1,438 kcs.); 211.3 m. (1,420 kcs.); (1,402 kcs.); 218.2 m. (1,375 kcs.); 221.1 m. (1,357 kcs.); 225.6 m. 214 m. (1,330 kcs.); 228.7 m. (1,312 kcs.); 235.1 m. (1,276 kcs.); 236.8 m. (1,267 kcs.); 251 m. (1,195 kcs.).

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THE CONTENTS OF
MARCH
"WIRELESS MAGAZINE"

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Good News from Geneva

By JAY COOTE

NEWs has reached us that at the recent meeting at Geneva of the International Broadcasting Union, the entire question of channels on the long waveband was thrashed out and that in their deliberations the delegates carefully took into consideration all stations belonging to States, irrespective of whether they adopted the findings of the Lucerne Plan or not.

This makes good reading, inasmuch as it was essential that concrete facts such as the claims of Radio Luxembourg, Kootwijk, Warsaw, and other dissenters, should be acknowledged.

So far as I know at the time these lines are penned, suggestions for alterations in some twelve channels have been put forward—changes which it is hoped will clear up difficulties by giving a meed of satisfaction to everybody interested in broadcasts from transmitters operating on channels above 1,000 metres.

Special Long-wave Tests

During the next few weeks we may, therefore, expect to hear tests being carried out, but the full adoption of the proposed plan will not be made, I think, until July next, as there is to be further meetings of the members of the Union in London between June 12 and 20.

It would also coincide with the withdrawal of Eiffel Tower from the long waveband, an event which has been officially promised by the French authorities. It has been stated in Paris that Eiffel Tower will eventually work on 206 metres, but to do so lengthy alterations must be made to the plant.

In the meantime, however, although working at full power during the day on its present channel, from G.M.T. 7.30 p.m., it is being cut down to roughly 7 kilowatts. This arrangement should help to relieve interference temporarily. (In parenthesis, it should be added that the new scheme of reallocation on the long waves will not affect the Daventry National channel.)

Hungarian Gypsy Orchestras

Whenever I turn to Budapest in the late evening hours it seems that invariably I hear a tzigane band; in fact, the broadcasts of these gypsy orchestras are so frequent that one might believe the Hungarians never listen to any other kind of music.

However, according to a report from the Magyar capital, the powers that be are not satisfied with the performances of these wailing Hungarian melodies, contending that their interpretation by the different bands tends to make them lose their true native individuality.

Following a decree to place them all under a single control, it is now said that the leaders have declared a general strike, so until matters have been adjusted we may find that Budapest's late concerts have assumed a more modern and Western character.

Austria promises for the duration of the Salzburg Music Festival, held between July 18 and September 2, a regular bi-weekly series of relays to be broadcast through all transmitters, including the Bisamberg high-power station.

These performances will be noteworthy for the fact that for the direction of both orchestral concerts and operas such well-known celebrities as Sir Thomas Beecham, Willem Mengelberg, Toscanini, Bruno Walter, Furtwangler, and Richard Strauss have been specially engaged. Operatic works by Weber, Mozart, Wagner, and Strauss will also be broadcast.

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19/6



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Will every querist please observe the following revised rules?

Please write concisely, giving essential particulars. A fee of one shilling, postal order (not stamps), a stamped, addressed envelope and the coupon on this page must accompany all queries.

Not more than two questions should be sent at any time.

The designing of apparatus or receivers cannot be undertaken.

Slight modifications of a straightforward nature only can be made to blueprints. For more serious alterations the minimum charge is 2/6.

Blueprints supplied by us will be charged for in addition, but of course, readers may send their own blueprints for alteration.

Modifications to proprietary receivers and designs published by contemporary journals cannot be undertaken. Readers sets and components cannot be tested by us. Queries cannot be answered by telephone or personally. Readers ordering blueprints and requiring technical information in addition should address a separate letter to the Information Bureau and should see that their remittance covers the price of the Blueprint and the amount of the query fee.

We do not answer queries in cases where the fee is omitted.

Queries should be addressed to the Query Dept., "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.

BANKRUPT BARGAINS.—List free with 3v. diagram. Any kit supplied. Just in. Marconi Model 248 2v. sets with valves 30/-. Majestic 4v. Super Sets A.C. mains £5 2s. 6d. Ekco K12 A.C. eliminators with charger, 40/- Polar 2-gang full vision dial trimmers screened, 7/6. Lucerne coils 3/6. Universal Super Het 4 v. Mullards, Magnavox, £8. Tecalemit Two SG pentode M.C. D.C. Mains £4 10s. Many other cheap mains sets. All the usual lines.—Butlin, 143B Preston Road, Brighton, Preston 4089. Part exchange.

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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.

T.C.C. Condensers

THE new T.C.C. catalogue contains details of the complete range of condensers for constructors. Wet and dry high-voltage electrolytics in the usual cylindrical containers, small low-voltage high-capacity electrolytics, large and small high-voltage mica, tubular and postage-stamp types, and a range of paper condensers in metal cases with soldering-tag connections are included. There are also subdivided block condensers, buffer units and mains-disturbance suppressors. 149

Pifco Radio Meters

SEVERAL useful meters are included in a new catalogue of Pifco. The star model of the range is the eight-range meter at a very reasonable price. The various ranges are selected by means of an octagonal knob on the side of the case, the ranges being clearly marked on the eight sides of the knob. Filament, grid-bias, and high-tension voltages and current up to 250 milliamperes can be measured—as well as filament, battery, and resistance tests.

Also included in this catalogue are the All-in-One, the Electrometer, and the De Luxe moving-coil meters. Send for this catalogue and decide the model you will buy. 150

FULL-SIZE BLUEPRINTS

When ordering, please send Postal Order, NOT STAMPS. Quote the Blueprint number shown below: not the number of the issue.

THREE-VALVE SETS (1s. each)

- Everybody's Home Radiogram (SG, D, Trans) AW381
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- A.C. Triodyne (SG, D, Pen) AW399
- Home-built Coil Three (SG, D, Trans) AW412
- £5 5s. S.G.3 (SG, D, Trans) AW414
- A.C.-D.C. Universal Three (SG, Det, Pen) AW417
- 1934 Ether Searcher (SG, Det, Pen) Baseboard AW419
- 1934 Ether Searcher (SG, Det, Pen) Chassis AW422
- Lucerne Rangem (D, RC, Trans) WM318
- Simple-tune Three (SG, SG Det, Pen) WM327
- Tyers Iron-core Three (SG, SG Det, Pen) WM330
- Economy Pentode Three (SG, D, Pen) WM337
- Three-range Three (SG, D, Pen) WM336
- Simplicity A.C. Radiogram (SG, D, Pen) WM338
- A.C. Transportable (SG, D, Pen) 1/6 WM347
- All-wave Three (D, 2 LF) WM348
- "W.M." 1934 Standard Straight Three (SG, Det, RC, Trans) WM351
- Emigrator for A.C. (SG, Det, Pen) WM352
- Economy S.G.3, with Lucerne Coils (SG, Det, Trans) WM263A

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- "A.C. Melody Ranger" (SG, D, RC, Trans) AW380
- "A.W." Ideal Four (2SG, D, Pen) AW402
- "Words and Music" Radiogram (2SG, D, Trans) WM307
- "Words and Music" Radiogram de Luxe (2SG, D, Q.P.P.) WM307a
- Home Short-waver (SG, D, RC, Trans) WM311
- Empire Short-waver (SG, D, RC, Trans) WM313
- Merrymaker Super (A.C. Super-het) WM345
- 1934 A.C. Quadrydne (2 SG, D, Pen) WM349
- Lucerne-Straight Four (SG, Det, Trans) WM350

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of most of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine." Address letters:

Amateur Wireless Blueprints Dept., 58-61 Fetter Lane London, E.C.4

Remedying Faults in Television Pictures

Continued from page 289

expanse of white below, as in the case of an artist with a white shirt. These shadow faults may also be due to the use of too little high tension or incorrect bias on the output valve. Generally speaking, unwanted shadows which appear to travel up the picture are an indication that the low-frequency amplification needs modification.

When an ordinary broadcast receiver is used for the reception of the vision signals, it will sometimes be found that improved results can be obtained by slight detuning; this expedient will often be effective in reducing a halo effect which shows itself as light bands where there is much contrast in the picture.

Interference effects are fairly easy to recognise. Heterodyning reveals itself as a sort of mesh over the entire picture, as shown by Fig. 4; oscillation gives a sort of herring-bone super-imposed mesh. Vertical shadows, of which six usually appear and move across the picture, are due to A.C. interference as a rule, though sometimes they are produced by interference by the carrier of another station.

Bold Splashes of Light

Bold splashes of light which are only momentary will probably be due to lights being switched on or off in the vicinity. If these persist then the probability is that the motor is sparking, but in this case, provided that the picture is steady, the splashes will occur in the same position. Atmospheric, if bad, will momentarily blot out the entire picture, the screen for the instant becoming brightly illuminated or being blacked out.

Owing to the difficulty of photographing television pictures the illustrations used have been treated to give some idea of the effects mentioned.

Radio-cabinet Bargains

THOSE who are on the lookout for bargains in new and unused radio cabinets—including radiogram, pedestal, and loud-speaker models—should take advantage of the stocktaking sale now being held by the Carrington Manufacturing Co., Ltd. Their showroom at 24 Hatton Garden, London, E.C.1, is open for this special occasion from 9.15 a.m. until 5.45 p.m.

J. H. Whitley's Radio Set

IN our reference to J. H. Whitley's South American trip in our news page last week, we said that his short-wave set was specially designed by B.B.C. engineers.

In this we were misinformed by the B.B.C. Actually the set used is an Eddystone All-world four, complete with an Eddystone loud-speaker, both made by Stratton & Co., Ltd., of Bromsgrove Street, Birmingham.

Pick-up for A.C. Century Super

IT should be noted that the Cosmocord pick-up for the 1934 A.C. Century Super is the Universe Standard type, with a built-in volume control. The price of this model is £1.

Add 50/- WEEKLY to your earnings

by charging accumulators in your spare time. Complete plant incorporating Westinghouse Rectifiers to charge 106 cells weekly. Trade price, 4 guineas, or 8/- monthly. Models for A.C. and D.C. mains also Charger for H.T. Accumulators. Send for descriptive booklet.

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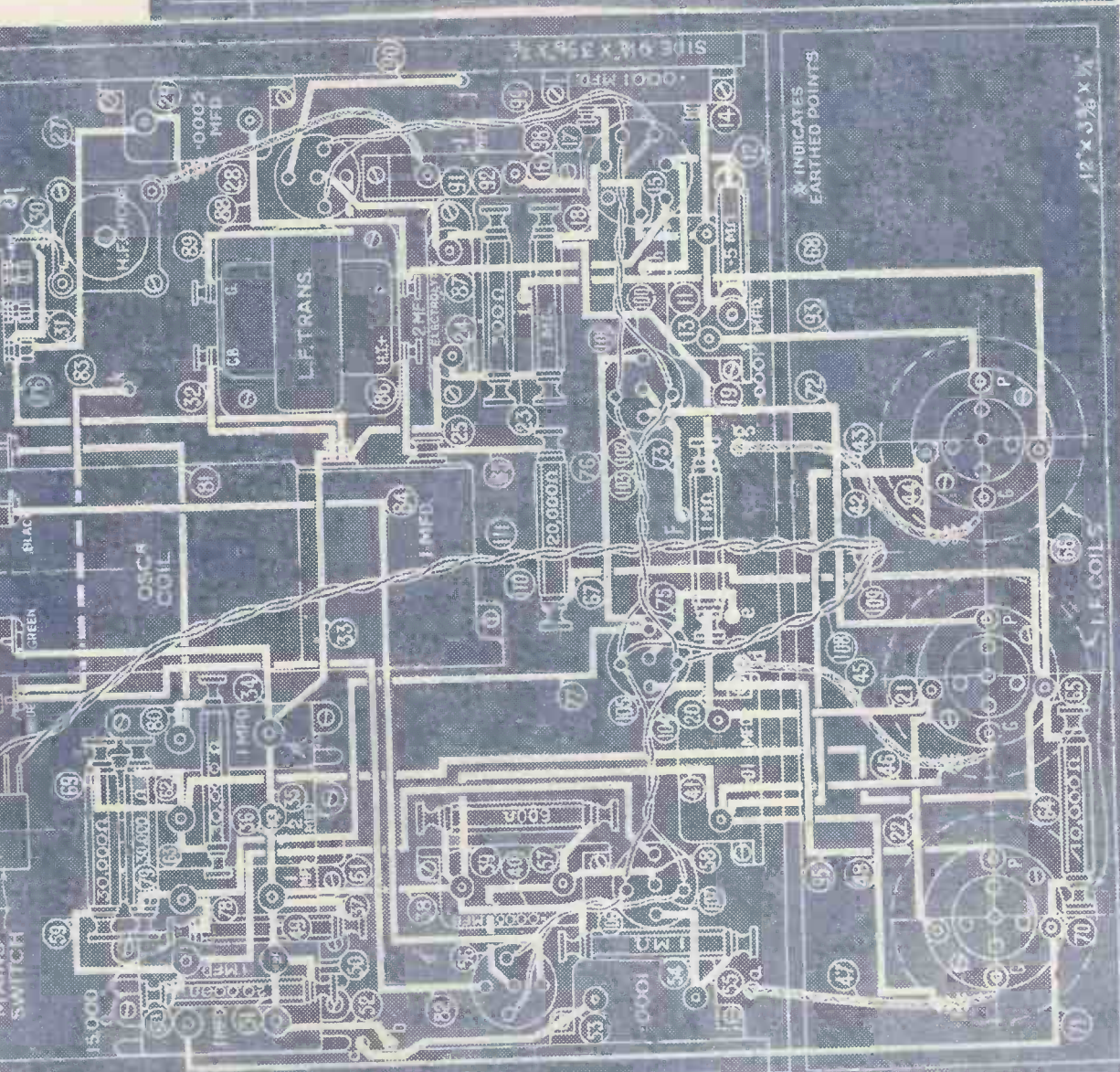
Standard Telephones and Cables, Ltd. St. Chad's Place, 364 Gray's Inn Road, London, W.C.1. Terminus 0235.

Amateur Wireless
FEE 1/-

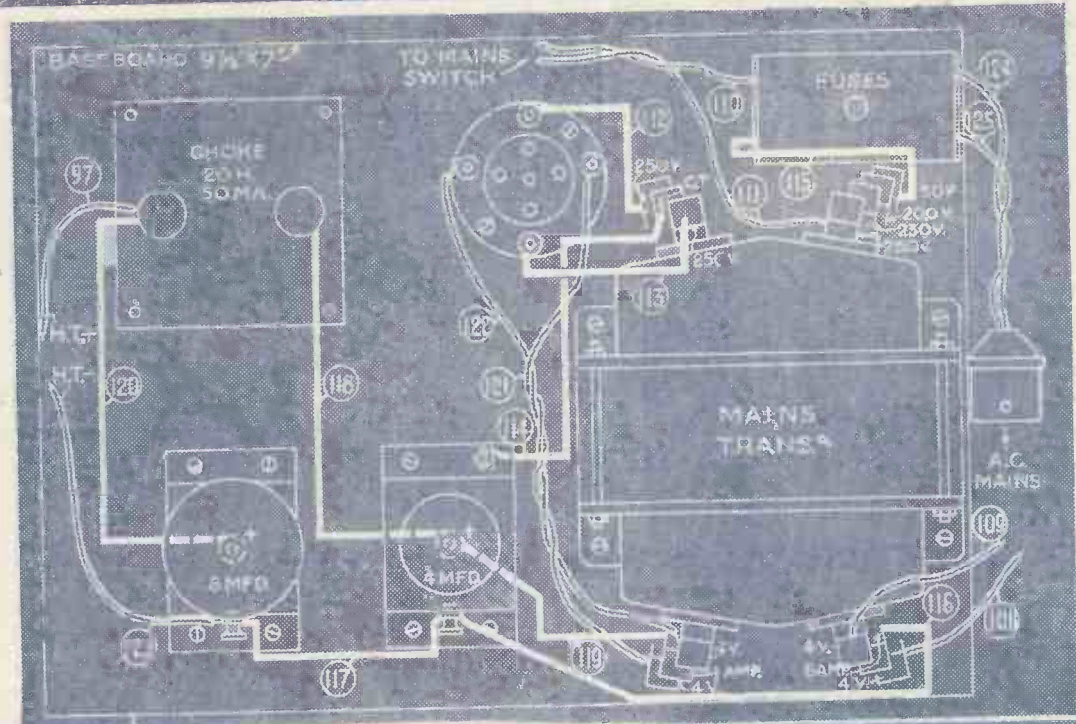
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Before building this set read the preliminary article on pages 264-265 of last week's issue; the constructional and operating details on pages 279-280 of this issue; and the test report on page 294



Last week we gave preliminary details of the 1934 A.C. Century Super. This week constructional details are given (pages 279-280). When wiring up the leads should be put in place in the numerical order indicated. Holes in the chassis for connecting leads are identified by means of small letters. A full-size blueprint can be obtained for 1s. 6d., post paid (ask for No. AW425)



As will be seen from these layouts the mains portion of the set is built up as a separate unit, which can conveniently be accommodated in the bottom of a radio-gramophone cabinet (see page 279)

The Next Time
you buy H.T.



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LIFETIME'S
SUPPLY

50 TIMES CHEAPER THAN BATTERIES

Why tolerate the annoyance and expense of short-lived dry batteries when an "ATLAS" Unit will instantly convert your battery set to mains operation and cut running costs to less than one shilling a year? You can fit an "ATLAS" Unit to your receiver to-day without alteration to set or valves. Ask your dealer to demonstrate, and INSIST ON "ATLAS." No other Units have won the Olympia Ballots for two years in succession. Models for A.C. and D.C., suitable for any set, even "Q.P.P." or Class "B," from 39/6 or 10/- down. Models for 25 cycle mains supplied at the same prices.

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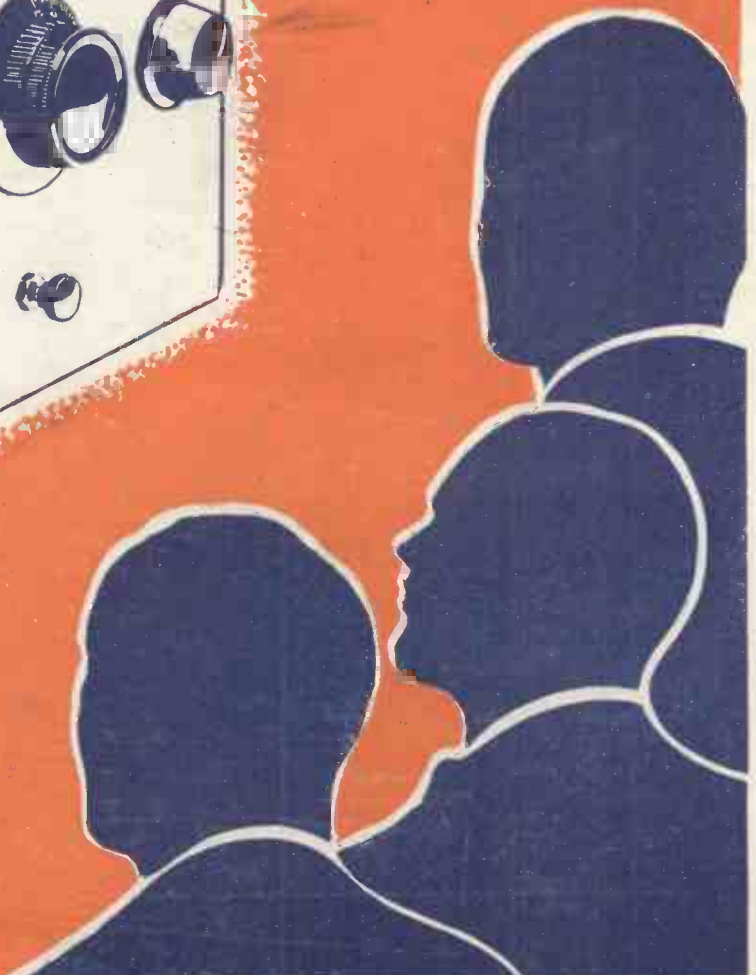
GRAND NATIONAL
BROADCAST

A "Two" for
27/-



Another
Lucerne Coil
Set!

The
**LUCERNE
MINOR**



PANEL 10X7
3/16" PLYWOOD

LAST WIRE No 35

BLUEPRINT
No A.W.426

Checked
by - *ALC.*

REACTION COND.SR.
.0005 MFD.

TUNING COND.SR.
.0005 MFD.

WAVE-RANGE SWITCH

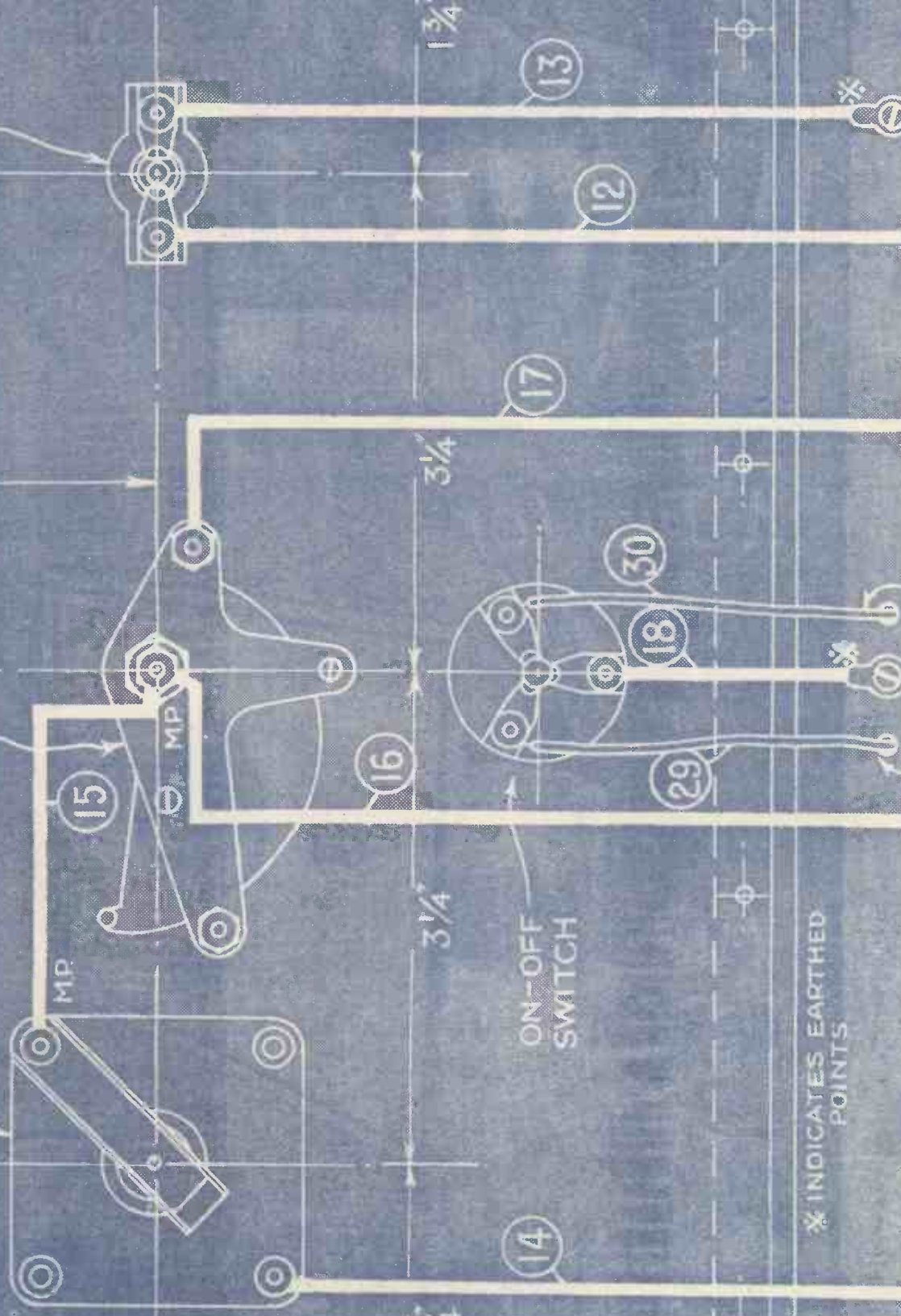
3"

1 3/4"

3 1/4"

3 1/4"

1 3/4"



* INDICATES EARTHED POINTS

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News and Gossip of the Week

North Wales Relay

AFTER our hint of a studio at Bangor comes still more important news. The B.B.C. is considering the idea of a 2-kilowatt relay, to be erected somewhere in North Wales, to be synchronised with West Regional.

This is great news for an area of the country at present very poorly serviced by the B.B.C.

Avoiding the Mush

WHY only 2 kilowatts? That is what many listeners may ask. Truth is that any higher power would spoil the West Regional's service area by setting up a mush background within it.

With only 2 kilowatts this is not likely to happen, especially as the Snowdonia range will effectively shield the relay's signals from West Regional's area.

Watching an Experiment

THIS North Wales plan depends for its fulfilment on the result of the experiment of synchronising Bournemouth and Plymouth.

Later it is hoped to put up the power of both these relays to 5 kilowatts, and, if good reception is still possible without mush, the way is opened up for the erection of relays in other parts of the country.

Morning Television?

WHILE all this talk of cutting down the medium-wave television transmissions from London National is going around, we have heard it suggested at the B.B.C. that special transmissions could easily be given in the mornings.

They would most certainly help traders to demonstrate television apparatus—but what is the good of that if the customers cannot tune in any vision at night?

Val Gielgud Inundated

AFTER Quarrel Island the other night, Val Gielgud, Director of Drama, asked listeners for opinions. He is now trying to wade through the mass of letters received.

At this rate Eric Maschwitz will come before the mike for opinions after every vaudeville show, Siepmann after every talk, and Dr. Boulton after every musical concert.

Are postcard writers to rule the wireless waves? It would certainly give the B.B.C. mandarins a rest.

Hide and Seek

AFTER the working man, the working woman. She wanted to remain anonymous, and the B.B.C. agreed. So when all the pressmen were hovering round the front entrance to Broadcasting House, a B.B.C. official escorted her out by the goods entrance.

Once again we point to the need for an underground passage leading from the B.B.C.'s "Big House" to the Langham Hotel opposite. It would be a boon to fan-ridden stars and others who want to avoid the ordeal of being mobbed at the entrance.

International House

FROM now on during the spring and summer months the B.B.C.'s headquarters will welcome a long string of foreign broadcasting officials, anxious to see how we do things in this country.

At the moment Sir John Reith and Sir Charles Carpendale are doing the honours to M. Chamicc, who is head of the Polish broadcasting system.

After Geneva

THAT much-discussed Geneva Plan for long-wave settlement has now been sent by the International Broadcasting Union to the Bureau of Telecommunications Union at Berne.

These people have to decide whether they shall call a meeting of Government representatives to ratify the plan. Already the indications are that some governments are against it.

How Daventry Stands

UNDER the Geneva Plan our Daventry stays put on 200 kilocycles, with Königswusterhausen on one side and Minsk on the other. This is good news, because at present we are quite clear of heterodyning—and we don't want to run into trouble just when the new Droitwich station is coming on the air.

Also under the new plan Radio Paris would be two channels away from Daventry, quite clear again of any interference.

Improved Microphones

AFTER months of experiments, the B.B.C. has decided to go in for moving-coil, condenser and ribbon microphones—keeping the carbon granule type of mike for stand-by work.

All the main regionals will be equipped with these modern mikes, which are less liable to hiss and blast than the older types.

Dropping Music Halls

TRUE to his policy of everlasting change, the Director of Variety has decided that after the middle of April there shall be no more Saturday night music-hall shows.

There will still be some variety shows from St. George's Hall, of course. John Southern, for instance, has promised to do another old-timers' programme in the near future.

Black's Show Coming

ON his way back from a cruise in the East, the famous George Black is already discussing

his forthcoming broadcast show. He is bound to put on something very special, so make a note of the date—April 20.

Licences Still Rising

DURING the month of February licences in this country increased by 67,000. And so we go on towards that seven million.

Effect of Press Attacks

WE shall be interested to see how far the very virulent press attacks now being waged on everything connected with the B.B.C. affect the licence curve.

We recall that in 1927, when all the newspapers were singing their hymns of hate about the B.B.C., the increase for the year dropped from half a million to a quarter of a million.

European Concert

ETHER-RAKERS might like to note that on March 25 the B.B.C. will be broadcasting a European concert, which means a concert that is relayed by many of the foreign stations over land line. They will take the programme from 21.05 to 22.30—to use the B.B.C.'s new twenty-four-hour timing system.

Try for the programme from Leipzig, Munich, Brussels, and Stockholm.

The Grand National

As in previous years, Messrs. Hobbiss and Lyle will give you a thrilling running commentary on the Grand National race from Aintree.

If you want to know how it is done, read the special article on page 306 of this issue.

Lucerne Minor

TALKING of good things in this issue, don't miss the full story of the Lucerne Minor set described by "The Experimenters" on pages 307 and 308.

This little set makes admirable use of the new Lucerne coils, and will meet a real need among those on the look-out for a good local-station set.

For Schoolboys!

JUST as the schools are breaking up for the Easter holidays, we shall be out with a special number of great interest to all radio-minded schoolboys.

Look out for this outstanding issue NEXT WEEK. It will contain two "how-to-make" articles, as well as lots of hints for all fans!



H.M.V. photo

We all enjoyed the Boat Race broadcast. And here are members of the Cambridge crew relaxing at their training quarters. By the look of things they have timed-in a good programme

Broadcasting the Grand National!



Down at the first fence! You will get all the thrills of the great race at Aintree if you listen on Friday, March 23!

ON Friday, March 23, the B.B.C. will broadcast one of its most thrilling annual events—the Grand National. At 2.45 p.m. the commentators will take up their positions at two strategic points round the course, describing the scene before them, as they wait for the cry at 3 o'clock "they're off!"

Gerald Cock, Director of Outside Broadcasts, always looks upon this show as one of the most difficult in the B.B.C.'s calendar. This year, though, he will be well out of it—

technical trickiness there is in the Grand National broadcast. During the course of the race, which lasts about 8 minutes, there are no less than four changeovers from Grand Stand to Canal Turn—all of which have to be effected without appreciable loss of continuity at the listener's end.

on vacation in Central America.

His plans have been well laid, though, and there is very little chance that anything will go wrong, especially as the arrangements for this year's broadcast are practically the same as last year.

Very few listeners realise how much

Fade units do the merging from one commentator to the other, with specially laid lines linking together the two commentary points, the whole system controlled by the apparatus in the B.B.C.'s O.B. van at Canal Turn.

It was not always so. Right back in 1927, when permission to broadcast the commentary was first obtained, the O.B. men realised that it was a tricky course. Low clouds all too frequently prevent a clear view from the Grand Stand to Canal Turn—some three-quarters of a mile away. Two commentators were inevitable.

They Used Portables!

In the early days they kept in touch with one another by means of portable sets, so that when one stopped the other took up the tale as the horses came into view.

Since 1930 it has been better managed, land lines being specially installed between the two points, with the van acting as a sub-control point.

Now for a word on the men who will take the responsibility of commentating. Meet Messrs. Bob Lyle and Bill Hobbiss!

Hobbiss the hawk-eyed. He must have a special sort of vision, for he is said to be able to see almost through clouds. Certainly his eyesight is extraordinarily keen. He often reads the races for His Majesty the King.

Lyle is of course well known as the Racing Editor of *The Times*. R. C. Lyle—what he does not know about racing is hardly worth worrying about.

These are men well qualified to give you a thrilling account of the Grand National. Let us hope that you will be able to listen-in.



Times Photo
Capt. R. C. Lyle

Police Radio in America

By Our American Correspondent, Lionel Merdler



American police car fitted with all kinds of guns, hand grenades, and gas bombs to fight the gangsters!

RADIO-EQUIPPED police have now become an accepted feature of American life and there is no doubt that the police have in their hands one of the most effective means of fighting crime evolved.

Each police force has its own wavelength allocation, which is fixed between 100 and 200 metres. The system is essentially a one-way system, that is instructions only may be received from headquarters.

For a given city police equipment the wavelengths of the various receivers are

used with separate batteries. One of the valves acts in the automatic volume control circuit and the output is one of the new-type pentodes. The various units are connected with heavily screened cable and ruggedness characterises the whole assembly.

pre-set and a volume control and on-off switch only are used. This relieves the officers from tuning-in and assures immediate reception when switching on. There is the further advantage that police calls from other cities are not picked up and errors and unnecessary duplication of work are eliminated.

In the car illustrated a six-tube super-heterodyne receiver is

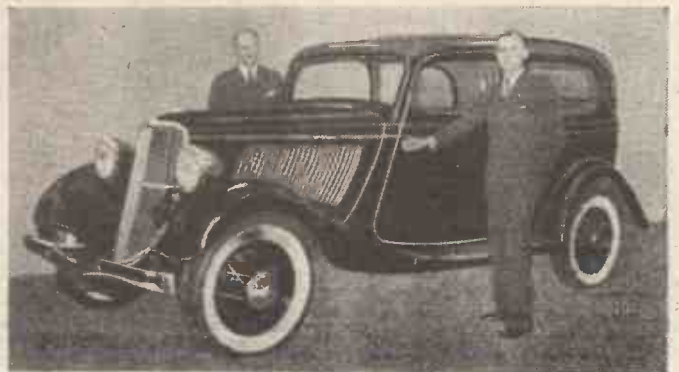
Several manufacturers have now entered the police radio field. At the Ford Exposition in New York a Ford car was shown fitted with a Spartan communication system on which police calls could actually be heard during the exhibition.

This car is also completely fitted with the standard police-car equipment, which is made up as follows:

1 Thompson machine gun and magazine. 1 20-gauge sawn-off shot gun. 1 riot gun. 1 gas billie. 6 gas hand grenades. 6 gas bombs. 1 first-aid kit. 1 gas mask.

These are all available for instant use. I was informed that the first-aid kit proves useful for street accidents.

The sawn-off shot gun certainly looked a vicious instrument!



Typical American police car, equipped with Spartan radio gear for keeping in touch with headquarters

And Now a LUCERNE MINOR!

By *The Experimenters*

WE blush at the things the AMATEUR WIRELESS staff say about us—really we do. Last week—for example, they told you in glowing terms about our latest venture—a two-valver designed to make the most of one of the Lucerne tuning coils.

A word on these coils. They have gone down amazingly well with amateurs. We have been surprised at the accumulating evidence of their popularity. It seems that for once we did something just at the right moment.

Just when you were all wondering how on earth you were going to exist under the Plan de Lucerne we came out with a special design for a coil that would ring the bell in two ways. First, a really decent tuning range, medium waves from 180 to 650 metres, and long waves from 850 to 2,100 metres. Secondly, variable selectivity.

Varying Aerial Tap

This second feature of the Lucerne coil is very important. By varying the aerial tap you can make the coil exactly suit your local conditions, giving you just as much selectivity as you need. All you have to do is to take off one or two turns to increase selectivity, or add one or two if you want more volume.

Well, that's the coil. It has been exploited—that's the word, we believe—in the Lucerne Three, and many of you seem to have built that set and become "Experimenter" fans for life as a result.

Well, that is very gratifying. As a matter of fact, we are really a couple of very modest lads—almost shy, in fact. The Editor has been concerned about all this success, and wonders if it will run to our heads. Not a chance!

The proof that it has not is this week's set, a simple "two" designed for a class of reader too seldom considered these days—a class needing wireless reception with the minimum expense.

Now initial expense is not the only thing that worries some listeners. They also have to count the pennies in the running cost.

We should like to stress that this Lucerne Minor is at once cheap to build and cheap to run.

Cost of Building

Even if you have to buy every component in the design the total cost need not be more than 27s. And as for the running cost the total anode-current consumption is only 5, or at the most 6 milliamperes, from a 100-volt high-tension battery—which means that a standard type of battery—cheapest type, that is—will not be at all over-run and will therefore give its full span of life.

You may ask for what reception is a two-valver suitable. We will try to answer that before going any farther. A two is primarily for local-station reception with the very minimum of running expense. But such stations as Radio Paris and Luxembourg, and the



Putting the Lucerne Minor through its paces in the AMATEUR WIRELESS laboratories. It will drive a moving-coil loud-speaker.



Note how straightforward is the assembly of the Lucerne Minor—a two-valver that can be built for 27s.

nearer home stations, all come in very well. We can make a conservative claim for twelve stations on the loud-speaker—assuming an aerial and earth of normal efficiency.

By the way, this two is the result of a special demand from many readers. We are always willing to oblige. So much so that for another section of our readership we have just put the finishing touches on a Lucerne Major—a "hot" set with two screen-grid high-frequency stages.

Brass Tacks!

More of that anon, for now we must get down to the brass tacks of the little two illustrated this week. As you might expect, the high spot of the design is the Lucerne coil. It is a grid coil, that is, a coil with a reaction winding and the usual medium- and long-wave windings for use with an external two-point switch.

For new readers we might say that full details for making this coil for yourself for the modest price of 2s. 6d. were given by us in the January 27 issue of AMATEUR WIRELESS. You will have to hurry if you want one of these back numbers, as they are rapidly running out of print.

In the Lucerne Minor we have used two other components that you can make up for yourself, for they are designed by us and marketed in kits. One of these components is the high-frequency choke, which as a kit is only 1s. 6d., and the other is the low-frequency transformer costing only 3s. 6d. for the kit.

Raw Materials

So that really if you feel inclined you can make up this set very much from raw materials. On the other hand these three very important components can be obtained for reasonable prices already assembled.

Apart from these components the Lucerne Minor uses a tuning condenser of .0005-microfarad capacity. This is of the air-spaced type—having a much higher efficiency than the cheap solid-dielectric type.

The remaining components needed to assemble this little set are the valve holders—one four-pin and one five-pin—two resistances, two small fixed condensers, a pre-set aerial condenser, a .0005 mica-dielectric reaction condenser, two terminal strips, two switches, and a 1-microfarad condenser.



Here is the set with the valves in position all ready for use. A full-size blueprint appears on the inside covers

BUILD THE SET FOR 27/-
By winding your own tuning coil, high-frequency choke and low-frequency transformer you can assemble the Lucerne Minor for 27/-. Details of these components were given in the following issues of "Amateur Wireless":
COILS.—Pages 112, 113 and 114 of "A.W." for January 27 and page 248 of "A.W." for March 3.
HIGH-FREQUENCY CHOKE.—Page 132 of "A.W." for February 3.
LOW-FREQUENCY TRANSFORMER.—Page 163 of "A.W." for February 10.
A limited number of these issues is available from the Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4, at 4d. each, post paid.

PANEL 10x7
3/16" PLYWOOD

LAST WIRE NO 35

BLUEPRINT
N°AW426

Checked
by *Mc*

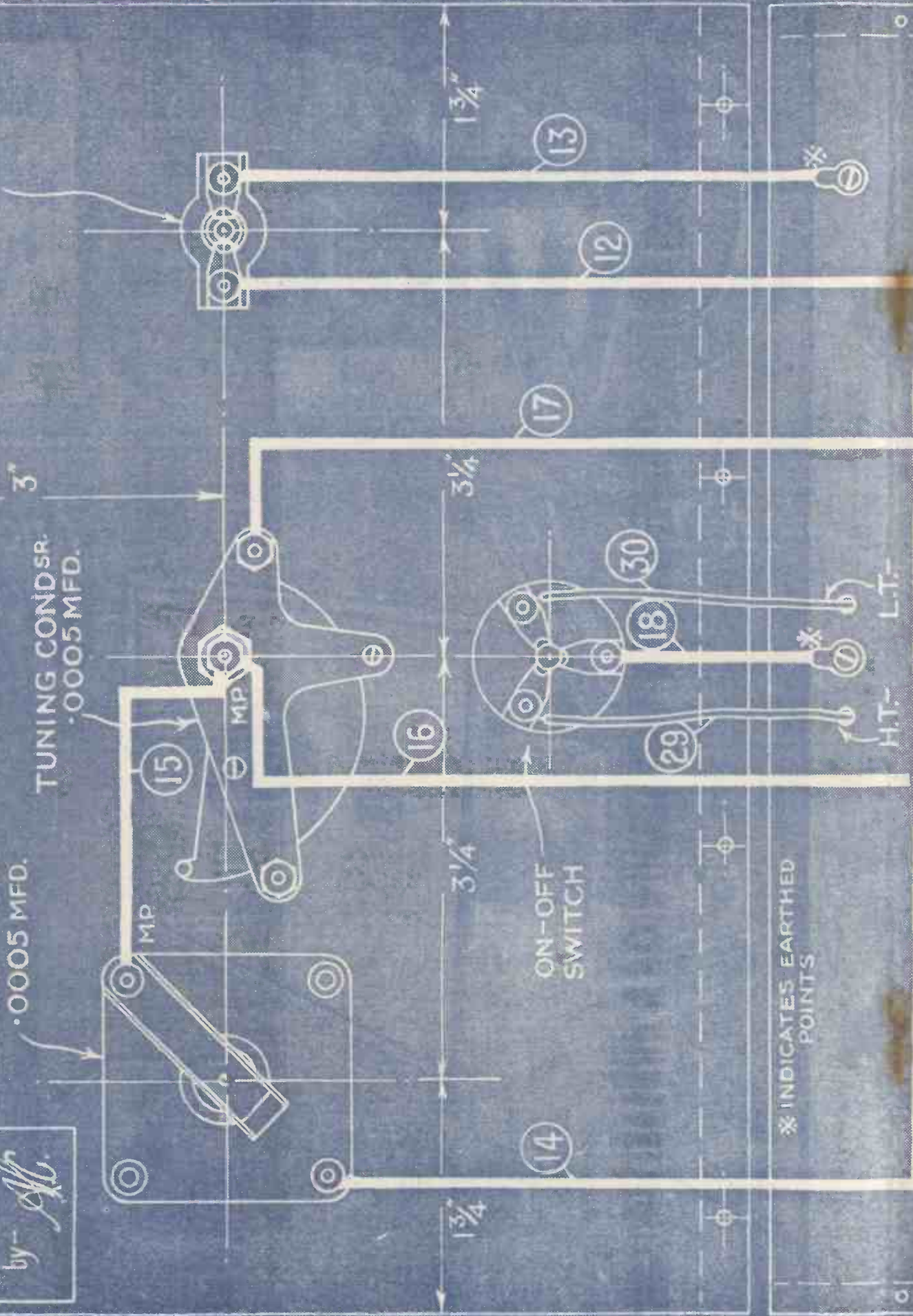
WAVE-RANGE SWITCH

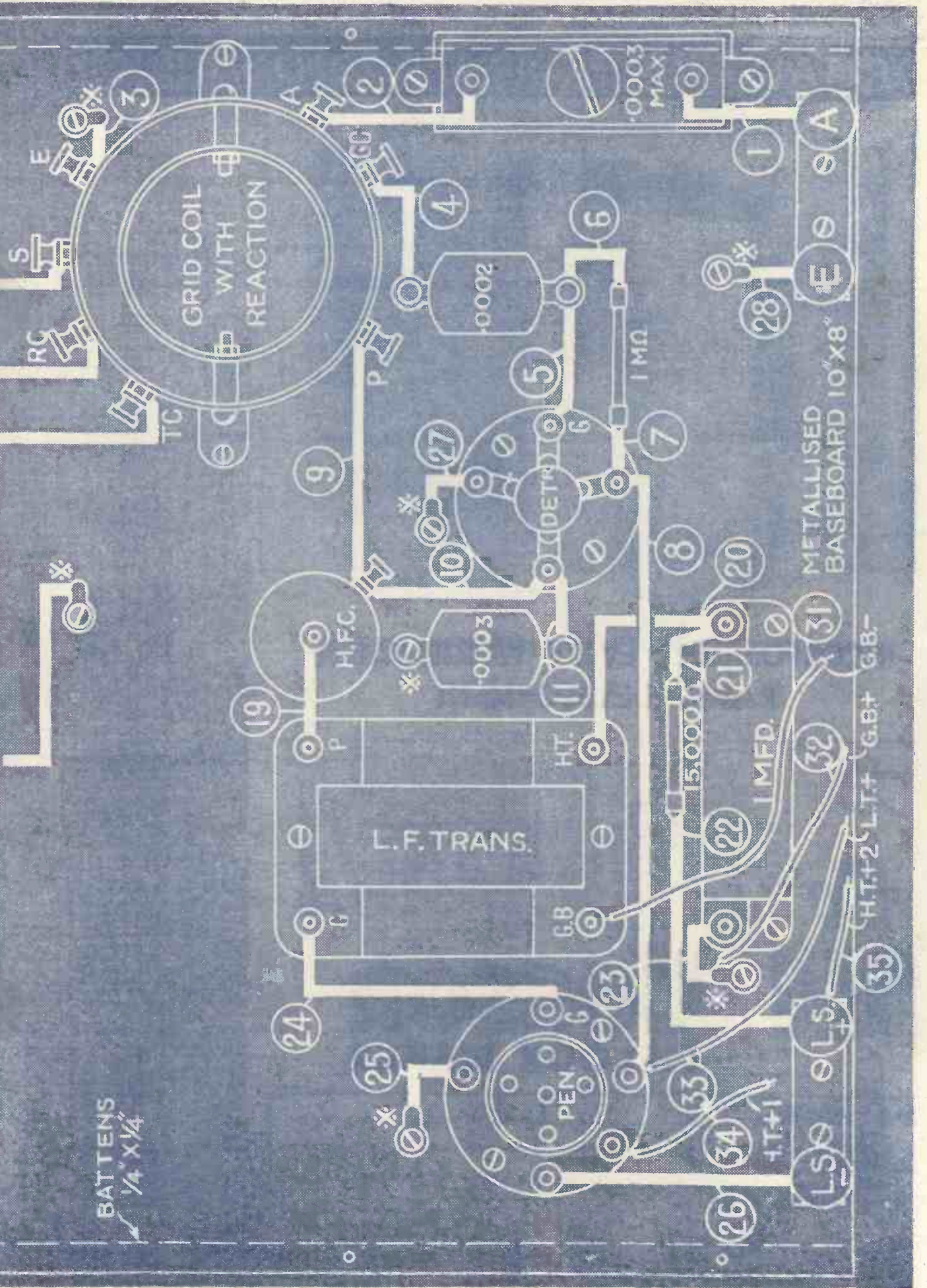
TUNING COND^{SR}.
.00005 MFD.

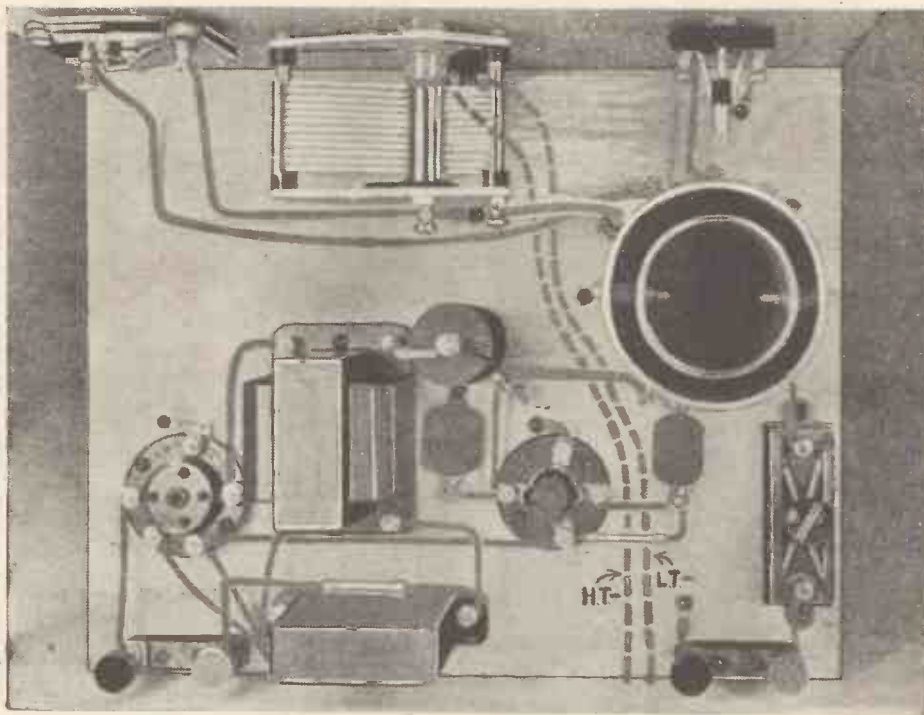
REACTION COND^{SR}.
.00005 MFD.

ON-OFF
SWITCH

* INDICATES EARTHED
POINTS



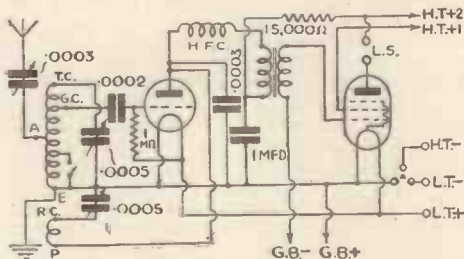




This photoplan of the Lucerne Minor should be used in conjunction with the full-size blueprint printed on the inside cover

All these parts are cheap and standard, and you must use your own discretion as to what price you pay for them. You will find that the all-in price of the kit of parts need not exceed 27s.

As you can see from the various illustrations, the layout consists of a wooden panel fitted at right angles to a metallised type of baseboard. You can use ordinary wood for the baseboard, but then it will have to be lined with tinfoil.



Circuit of the Lucerne Minor, a straight-forward two-valver

Our main reason for using metallised baseboarding is to cut down the wiring as much as possible. All the earthed wires go straight from their component terminals to the nearest bit of the baseboard.

We might go into these earthed wires a little more closely. The earth terminal on the terminal block, the two negative filament connections on the valve holders, one side of the 1-microfarad fixed condenser, one side of the .0003-microfarad bypass condenser, the earth terminal on the tuning coil, the right-hand side of the wave-change switch, the centre point of the on-off switch, and the moving plates of the tuning condenser, all go direct to the chassis.

Shortening Nine Wires

In practice this means that nine wires are very appreciably shortened—to the greater simplicity of the layout of the finished job.

Having got together all the parts there is no special order in which to assemble them, although we do suggest that you fix the on-off switch on the panel and then fit the panel

to the baseboard before you tackle anything further on the baseboard.

Then, when you have made the necessary connections to the three-point on-off switch, you will be saved a lot of bother later. The next component to mount is the coil. When you have wired up this with its seven connections you have gone a long way towards completing the set.

Shall we give you the detailed coil connections? You will find four terminals on the panel side and three terminals on the side of the coil facing the pre-set aerial condenser.

Take the three terminals first. The terminal marked on the blueprint as P goes to the bottom end of the high-frequency choke, and from that point to the terminal marked A on the detector valve holder. The terminal on the coil marked GC goes to one side of the .0002-microfarad grid condenser. The third

terminal marked A goes to one side of the .0003-microfarad preset.

Now for the other side of the coil. The terminal marked E goes direct to the nearest chassis point. The second terminal marked S goes to one side of the wave-change switch. The third terminal marked RC goes to the fixed plates of the reaction condenser. The final terminal marked TC goes to the fixed plates of the tuning condenser.

Chassis Connections

A word on the chassis fixed connections. First thread on to a wood-screw a soldering tag and screw this down hard to the appropriate point of the chassis. Then solder the end of a short length of bare wire to the tag and take the remaining end to the right component terminal.

In the wiring we have soldered some of the joints, as this is so much easier than fixing them down by pressure joints. But you please yourself, of course.

You will find the full-size blueprint given on the inside covers this week of great help when you come to the job of wiring. All the connections are numbered, and all you have to do is to follow our sequence and you can't go wrong. Start with No. 1 and go right through until you reach the last wire, which is No. 35.

For the Batteries

Battery connections are made by suitable lengths of flexes, with tags and plugs on the ends. There are five plug ends and two spade terminals, for high-tension, grid-bias, and low-tension. These connections are made to the various components, but all these are so clearly shown by the blueprint that we will not bother to detail them.

When you have wired up the job you can try it out. First, the batteries. The two tags will go to a two-volt accumulator, the two terminals marked grid bias going to a 4½-volt grid-bias battery—you may need a larger one, say 9 volts, if you use a larger power valve.

There are also three high-tension connections. The H.T.+1 goes to about 90 volts, and H.T.+2 to the maximum. If you can afford a larger battery by all means get one, plugging H.T.+1 into the socket about 10 volts below the maximum. This will ensure that the correct voltage is applied to the auxiliary grid of the pentode.

Of course, the detector valve is worked at
Continued on page 325

COMPONENTS YOU WILL NEED FOR THE LUCERNE MINOR

BASEBOARD	s. d.
1—10 in. by 8 in. metallised	1 0
CHOKE, HIGH-FREQUENCY	
1—as described in "A.W." for February 3	1 6
COIL	
1—Lucerne aerial type, as described in "A.W." for January 27	2 6
CONDENSERS, FIXED	
1—.0002-microfarad	6
1—.0003-microfarad	6
1—1-microfarad	2 0
CONDENSERS, VARIABLE	
1—.0005-microfarad, air-dielectric with slow-motion drive	4 6
1—.0005-microfarad, reaction type	2 0
1—.0003-microfarad, pre-set type	0
HOLDERS, VALVE	
1—4-pin	4½
1—5-pin	8
PLUGS, TERMINALS, ETC.	
5—wander plugs, marked H.T.+1, H.T.+2, H.T.—, G.B.—, G.B.+	7½
2—spade terminals, marked L.T.+ , L.T.—	4
2—terminal blocks	1 0
RESISTANCES, FIXED	
1—15,000-ohms	7½
1—1-megohm	7½
SUNDRIES	
2—strips of wood, 8 in. by ¼ in.	1 7½
3 yards of thin flex	
6 ft. insulated wire	
4—bolts and terminals	
Wood for panel, 10 in. by 7 in.	

SUITABLE VALVES FOR LUCERNE MINOR

Make.	Detector.	Pentode.	Price.
*Cossor	210Det	220HPT	£ s. d.
Hivac	D210	Y220	1 3 6
Lissen	L2	PT225	18 0
*Marconi	L210	PT2	1 3 6
*Mazda	L2	Pen220	1 3 6
*Micromesh	HLB1	PenB1	1 3 6
*Mullard	PM2DX	PM22A	1 3 6
*Osram	L210	PT2	1 3 6
*Six Sixty	210D	220Pen	1 3 6
Triotron	SD2	P225	15 6
Tungsram	LD210	PP220	19 6
362	L2	ME2	13 6

* Indicates B.V.A. valves.

SWITCHES

1—two-point shorting	7½
1—three-point shorting	10½

TRANSFORMER, LOW-FREQUENCY

1—as described in "A.W." for February 10	3 6
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ACCESSORIES

BATTERIES

1—120-volt high-tension	11 0
1—9-volt grid-bias	1 0
1—2-volt accumulator	4 6

Real Quality—2

Four Vital Factors in Quality Results

By NOEL BONA VIA-HUNT, M.A.



A real de-luxe receiver—it is a complete cocktail cabinet cum radio gramophone and is provided with a synchronised electric clock Keystone photo

PROFESSOR: Last week we had a very interesting chat on the subject of quality reproduction, and we saw that to get a straight-line frequency response for our human ears in this room the frequency response of the wireless receiver could not be straight without upsetting the balance between bass, middle and treble registers.

In fact, we got as far as defining the type of response curve a receiver should have in order to produce the required result from the loud-speaker. This particular curve has a rising characteristic at each end and more particularly at the bass end. So far, so good. Now we have to decide what is real quality. As an amateur musician you should know as well as I.

AMATEUR: I know it when I hear it; or I can tell you when it is not there.

A Few Samples

PROFESSOR: Well, you are my guest this time, having paid me the compliment of coming to my sanctum here, so I can now offer you a few samples of reproduction. I have in this room various sets, some commercially manufactured, others sent by amateurs for test and report. Now you shall assist me to make the reports on them, if you will.

AMATEUR: I shall be delighted to do what I can.

PROFESSOR: What do you think of this? Screen-grid high-frequency stage followed by leaky-grid detector coupled by means of a transformer to a pentode output valve. Permanent-magnet moving-coil loud-speaker.

AMATEUR: The tone is a little hard. The upper frequencies give a steely glitter, if I may so describe it. Also the various sounds don't seem to come through as clearly as they might. There is a distinct "lag" in the successive chords, though I am sure I don't know why.

But I have noticed this fogginess in nearly all sets that are not resistance-coupled in the low-frequency stage. In fact, that is why I adopted this method of coupling in my own set. Also the transients are not very much to the fore. I am not criticising the frequency response, as it is obvious that more bass is required.

Sound Critique

PROFESSOR: A very sound critique. It is fairly obvious, is it not, that this particular receiver, which has at least some good points, is not going to cause intense rapture to its owner if he sets any store by quality of reproduction.

AMATEUR: Speaking for myself, I should get bored with it in less than five minutes. I simply can't stand hard tone.

PROFESSOR: Now listen to this set which I am switching on while we have the opportunity of hearing the same item in the programme.

AMATEUR: I seem to prefer the tone of this one. It's pleasanter altogether. The quality is softer and more caressing. There is less high-note response than with the other one. But otherwise it is full of defects. Transients

are very poor, and the different instruments don't come out very clearly. The general effect is what I call "mushy." I must say I do like to hear everything come through clean-cut.

The other set was distinctly better in this respect; much as I criticised it. If I had to choose between the pair of them I really don't know what I should do! I prefer my own, with all its imperfections.

PROFESSOR: It's a pleasure to hear your lucid analysis. Of course, you have only touched the fringe of the subject. I could point to heaps more defects in both sets. However, just listen to this one—a three-valver like the other two.

AMATEUR: Oh, what a difference! It's lovely! Why, everything sounds quite changed. I could listen to this for hours.

PROFESSOR: I am glad it has your approval. Note that the loud-speaker in all three sets is the same, so that the differences must be due to the design of the receiver in each case. The loud-speaker itself could be improved without a doubt, but we are not concerned with this particular problem at present. The last set you have been listening to is one I have designed myself, and in due time we shall see what it consists of.

AMATEUR: My word, that's a set I should like myself.

PROFESSOR: There is no reason why you should not have it. With a better type of loud-speaker the results would be even finer.

AMATEUR: Should I have to scrap the whole of my present set, or could I just replace the unwanted components with new?



Paul Robeson is so pleased with his H.M.V. Super-het A.V.C. Portable Grand that he has sent one to his son at school

PROFESSOR: In your particular case you could easily take out certain parts and substitute what are required, and that would save you quite a lot of expense.

AMATEUR: That's most gratifying, as I naturally prefer to keep what I can after all the expense of making my present machine.

Question of Actual Design

PROFESSOR: Quite so, but we must not travel too fast in our little discussion this evening. The question of actual design must wait till we have finished our talk on "real quality."

AMATEUR: Right you are. Have you any more sets to show me?

PROFESSOR: Oh dear, yes. The last one, of course, does not belong to the list of receivers sent to me for report, but it serves as a useful standard by which to judge others. Here is another rather high-priced set, consisting of two stages of variable-mu high-frequency, power-grid detector, and two low-frequency stages, the latter being coupled by resistance followed by a first-class transformer.

As you know, this method of low-frequency coupling is extremely popular in cases where the output valve is a power triode instead of a pentode. What do you think of the tone?

"Hardness" in Quality

AMATEUR: Very hard, to my ears. The balance of registers is none too good, either. But the chief characteristic in quality is hardness. This is just the sort of tone that one always associates with "canned music." You know it's wireless at once. No doubt there are other defects, but this hard steeliness of tone seems to take precedence of all else. It simply gets on my nerves. Do turn it off.

PROFESSOR: Many apologies for torturing you, I am sure. The hardness you complain of so bitterly is due partly to the detector system employed but mainly to the loud-speaker. The method of centering is responsible for resonant peaks in the frequency response curve in the region of 3,000 to 4,000 cycles.

No wonder you actually felt the distortion which this set inflicts on a musical ear, since the sympathetic nerve is very sensitive to these frequencies.

AMATEUR: Well, sweet sounds are meant to soothe, not irritate. If there is one thing I

insist on in musical reproduction it is *softness* of quality. I once remember a musician friend of mine telling me that all musical tones should be "well oiled." A funny expression, but very apt. A beautiful polish does make such a lot of difference to a thing.

When you hear music properly produced, when the quality is soft and soothing, I really believe it does materially affect the whole of the nervous system.

PROFESSOR: Of course it does. And yet I must sound a warning note here. Large numbers of people imagine that they can get

In none of these sets have you been able to discover any true balance between the registers lower, middle and upper.

So I think we may summarise the various points thus:

1.—The overall musical result from the loud-speaker must as far as possible represent a straight line of frequency response: that is, each and every note produced must reach our ears with equal and uniform intensity as it would do in the actual performance.

We may note in passing that to secure this desirable state of things we have to substitute a special curve of amplifier response for the straight line one in order to introduce the required compensation due to losses in bass and treble in the receiving apparatus. We thus secure a *correct balance of registers*.

2.—The quality of tone must possess a definite characteristic which for want of a better word we may call "softness." The presence or absence of this essential quality is in the main associated with combinations of notes rather than with single notes, and is especially associated with the reproduction of the combined wave-forms of a number of musical instruments such as in the modern orchestra.

In faulty reproduction not only the harmonic overtones, but also the "formant bands" with their individual energy contents are hopelessly distorted, and the greater the number of musical tones combined to form an ensemble the worse the distortion.

It is not too much to say that there is hardly a radio receiving apparatus in existence that does not distort those little formant bands in the reproduction of large masses of notes.

3.—Transients must be reproduced as faithfully as possible. By transients we mean the attack and collapse of a sound. Every note takes a definite time to be born and a definite time to die. The times vary in accordance

with the type of instrument producing the note.

The drum creates its note very smartly compared with the violin, whose note matures far more slowly. On the other hand, the drum note collapses less quickly than the violin note. When, however, the violin string is plucked instead of bowed, the birth and death of the note is very rapid.

Effect of Time and Manner

Moreover, not only the *time* but also the *manner* in which the note develops to maturity and collapses to silence plays an important part in forming its actual character or personality. All these little points are usually overlooked, and we cannot afford to overlook them.

4.—Lastly comes the *clarity* of the performance. Attention to the third essential just expounded obviously helps us very materially in our quest for this last feature in the reproduction. By "clarity" I mean a well-defined, clear-cut outline. Think of the opposite characteristic, namely "smudginess" or "mushiness." Every photographer knows that a clear outline is a mark of distinction in any picture he produces. The light and shade effects must be clearly defined. The goodness of a cinema picture literally depends on this feature of clarity and definition.

But it is equally essential to a satisfactory presentation of a *musical* picture. In radio reproduction clarity is obtained by (1) securing a faithful image of the transient wave-form, and (2) eliminating from the amplifier and loud-speaker alien resonances and frequencies.

Actual Frequency Range

AMATEUR: A very clear summary. But you have omitted from your list the actual frequency range of the receiver, have you not?

PROFESSOR: Yes. So long as we can count on a range of 40 to 8,000 cycles, we need not be over anxious about getting the complete compass through. I am aware that a certain class of critic will join issue with me here, but he is attributing undue importance to frequency range, since real quality does not depend on range provided the above minimum is allowed us for the reproduction of orchestral and organ music.

Naturally, one is glad to be able to extend that range if circumstances and one's pocket permit; however, we are discussing essentials, not luxuries, and a complete spectrum of notes from 23 to 10,000 cycles or more is an unquestioned luxury.



Voicing the pipes of the B.B.C.'s organ, which has 150 electrical stops and 2,326 pipes divided into thirty-one tones

what you call "soft" tone by cutting out the higher frequencies. And you can, in a sense, because hard tone is definitely produced by a disproportionate amount of energy and amplitude in the upper band of frequencies, with the result that a certain train of overtones is unduly developed in close formation. However, this is an exposition rather outside our discussion.

What I want to impress on you is the fact that softness of tone does not necessarily mean dullness or flatness. Softness can go hand in hand with keenness and brilliancy; that is to say, one may have a soft-toned flute on the one hand, and a soft-toned violin on the other. A clarinet should always possess a "soft" quality of tone, but so should the oboe, for all its acid character. So that softness does not mean flatness, since the keenest tone in the world can be soft as well.

Two Distinct Meanings

Unfortunately, the word "soft" has two distinct meanings: it may be the opposite of hard, or the opposite of loud. In our present use of the word we, of course, do not refer to that other meaning of "not loud." We use the word somewhat as we should if we were trying to describe what a piece of velvet feels like to our touch. It *yields* to the finger; it doesn't offer undue resistance. It soothes.

Musical tone should have the same effect on our senses as that piece of velvet. Do you agree?

AMATEUR: Absolutely.

PROFESSOR: We have now, I think, obtained a very fair grasp of the essential properties of real quality. The first and fourth receiver you have criticised adversely as possessing "hard" tone, and especially the latter. The second you thought "softer" in tone, though lacking in high-note response and in clarity. The transients in this case were also distorted.

SPECIAL SCHOOLBOYS' NUMBER NEXT WEEK!

In a few days' time schools all over the country will be breaking up for the Easter holidays. The evenings are still long and we cannot look forward to good weather with any degree of certainty. What better opportunity is there for schoolboys (and schoolgirls, too, for that matter) to turn their attention to radio?

Because we believe that thousands of boys will welcome something special to do these Easter holidays, we are preparing a very fine issue to meet their needs next week. We shall describe the construction of simple and cheap valve sets—including a short-waver—and a crystal set; good working sets

that will give pleasure, both in assembly and in operation.

And we are sure these sets will prove just as interesting to those grown-up "schoolboys" who like building their own receivers as to those who are still actually at school.

Everything will be shown in the simplest and easiest way and—most important to the younger generation—the question of expense has been closely watched. With the help of next week's special issue of *AMATEUR WIRELESS*, every schoolboy will be able to build a radio set of some kind at the very lowest cost.

Use the Easter holidays profitably this year and have something good to show for them!

Listeners' Letters

BOW BELLS

To the Editor, AMATEUR WIRELESS

I HOPE that the B.B.C. keeps on with Bow Bells for the interval signal. I told the B.B.C. that the old signal sounded like a death-watch beetle, and it does. Those people who think that the bells sound melancholy must be thinking of their wedding bells—and the results!

G. G. W. HOPE.

Crewe.

[1040]

CHEAP BATTERIES

AS a reader I should like to say that a 5s. battery new is better than one at £1 4s. that has been in stock a few months. None of your readers says anything about the age of batteries.

Also, if half of the complete block type of battery goes wrong, you have to throw it away. I find the cheapest one built up from 4 1/2-volt cells, and when I buy go to as many shops as I can and there is more chance of getting new ones.

S. GOFF.

London, N.4.

[1041]

"OLD MAN" THERMION?

THERMION'S remarks on the subject of cheap batteries have interested me very much, but it was only while reading his columns in to-day's issue (March 10) that I realised what a dreadful "battery-ridden" life the poor chap must lead.

"A series of over a thousand (life tests) which I have conducted." How did he do it? Did he test them all at once?

If the tests were made one at a time and assuming in each case a thirty-day test period, it would take 30,000 days or over 82 years. Whilst if the tests extended over a period of ten years, a fresh battery would be put on test every three or four days.

What a life! And yet Thermion finds time to write each week. . . . What a man!

H. A. BARBER.

Wealdstone.

[1042]

(P.S.—And what an expense!!! But perhaps the battery manufacturers supplied free of charge?)

LUCERNE COILS

I WRITE to say how delighted I am with your Lucerne coils. I have made a rough set-up of the Lucerne Ranger and the results are splendid.

I also made the Mascot set up two years ago and I may say I have been delighted with this receiver. Plenty of stations are available and the volume is all that can be desired, and pure.

Now I see you are publishing details next week on using the Lucerne coils in the Mascot set. This is great news, as I wanted to convert to a screen-grid with as little expenditure as possible.

T. STANLEY.

Manchester.

[1043]

FROM A NEW READER

THE huge army of radio experts who have not bothered to acquire a knowledge of elementary magnetism and electricity is rapidly increasing.

Take your story of the "old hand at the game who does not make many mistakes." He sends coils back to the maker, then to an "independent expert," because he could not locate an ordinary disconnection! Good gracious!

"NEW READER."

Harrow.

[1044]

Bow Bells from the B.B.C.



(Left) The famous tenor Bow Bell, which weighs 2 tons 12 cwt. (Right) Bow Bells after recasting; the total weight is 10 tons 7 cwt.

Gillett and Johnston photo

THE B.B.C. has struck its most original note in using Bow Bells as an interval signal, for they are the most celebrated peal in the world. The art of "ringing the changes," too, is entirely British.

The bells of St. Mary-le-Bow were mentioned in 1496, when the curfew was ordered to be rung at 9 o'clock in London.

After the Great Fire of 1666, Sir Christopher Wren undertook the rebuilding of the church, and he intended the beautiful tower to hold a full ring of twelve bells. It was not until 1881, however, that this number was completed and, several of the bells, being sadly out of tune, were recast in April, 1933.

If the layman were asked how many totally different changes could be rung on just those twelve bells, he would probably guess a few thousands. Actually, no less than 479,001,600 changes without a single repetition are possible.

To accomplish this would occupy forty years of non-stop ringing!

The oldest guild in existence, the Ancient Society of College Youths, founded in 1637, has the privilege of ringing at Bow Church, and is composed of the most skilled change-ringers in the country.

The guild holds the world's record peal, 21,363 perfect changes, which took over twelve hours to ring. This feat was achieved in Berkshire, in 1922, and has never been equalled in the annals of campanology.

Several legends are connected with Bow Bells, and Dick Whittington heard their curfew from Highgate Hill. There is, too, the old saying that those born within sound of them become Cockneys. One wonders whether "wireless" babies will now be admitted to the fold!

BOB MAJOR.

Tune-in These DX Tips!

WHETHER you are a hot short-wave fan, or just a broadcast-band listener with an itch to reach out, there is a certain KDKA transmission from Pittsburgh, Pa., U.S.A., that ought to intrigue you.

I refer to the Monday morning KDKA programme, which is sent to us on the medium waves on 305 metres, and on the short waves through W8XK on a wavelength of 48.5 metres.

The period of this interesting transmission is from 5.30 to 6 a.m. G.M.T., so get up with the lark next Monday morning and try your luck.

I have been reading a letter from the programme announcer of this half-hour—Joseph Stokes—and you can take it from me that he is very keen to enlarge his British listening circle.

He himself is a Britisher, hailing from Birmingham, and although he has been in the States for nine years he is still very keen on everything that is happening in "the old country."

Special Half-hour

In this special half-hour by the KDKA DX Club you are given tips on DX reception, as well as schedule news bulletins and other dope dear to the heart of the amateur.

Stokes is anxious to build up a world-wide audience for this programme, and is very keen to hear from all DX fans, clubs and so on, especially asking for suggestions and criticisms—all of which will be carefully considered and answered personally over the air during the DX'ers half-hour.

When you are straining to pick up the KDKA signals one Monday morning, just think of that announcer over three thousand miles

away—he, too, is a DX fan, and one of his dearest ambitions is to "snag" Midland Regional—the station of his home town.

If you are interested—and manage to pick up anything—just drop a line to Joseph Stokes, KDKA DX Club, Hotel William Penn, Pittsburgh, Pa., U.S.A.

Memorable Incident

I well remember during my visit to the States a few years ago calling on the KDKA folk; the incident being specially memorable because, having had breakfast at the William Penn—just after my arrival in Pittsburgh by the night sleeper from another part of America—I scoured the city trying to find the station when all the time it had been right over my head.

They were, I recall, a cordial crowd, and went to no end of trouble to take me out to the KDKA plant. In those days they were picking up the Dutch short-wave station and relaying it to Americans on the medium waves.

But now, of course, they are busy experimenting with super high-power broadcasting on the medium waves, as well as sending us one of the most reliable of short-wave signals through station W8XK.

So if you do write to Stokes you will be certain of a friendly "come-back." And, by the way, if you really are keen on long-distance medium-wave reception why not join the International DX'ers Alliance? This unique organisation has been formed to further the aims of all amateurs keen on logging distant stations. For fuller details I advise you to write to F. Wiseman, General European Representative, 65 Lovaine Place, Newcastle-on-Tyne.

ALAN HUNTER.

On Your Wavelength

By Thermion

New Long Wavelengths

THE recent U.I.R. Conference evolved a new scheme for the long-wave stations, the details of which have not yet been published. I hear, though, that it does make room for Luxembourg, as I predicted would have to be the case.

One hopes that, whatever it is, the plan will be found acceptable by the countries that have not so far come into line.

Though matters are a good deal better on the long waves than they were, they are bound to become a good deal worse, unless something is done, when new stations come into operation, as several are billed to do in the not far distant future.

I think that the experience of the last three months may bring some countries to their senses. They must realise by this time that it's not the slightest good adopting a "here-I-am-and-here-I-sticks" policy with regard to wavelengths if their stations are both causing interference and suffering from it.

The League and Broadcasting

DID you see that the League of Nations had drafted a Broadcasting Treaty and submitted it to European Governments? It was done a week or two ago, but the matter was not mentioned at the U.I.R. Conference, since it was felt that to do so might drag in politics.

I have long felt that the League of Nations is the proper authority to bring about an international broadcasting agreement; in fact, I said so in these columns at the time when the original Geneva Plan was having a rather sticky time.

Wireless has now assumed such gigantic importance in national and international life that it is a very fitting subject for the League to tackle.

When Transmitters Overdo It

A GOOD deal of what interference there is now on the medium waveband is due not to wavelength wandering or wobbling, but to over-modulation. The French stations in particular are rather bad offenders in this way.

Over-modulation, as you probably know, means indenting the carrier too deeply with amplified audio-frequency impulses from the studio. There is always a temptation to indulge in it because, other things being equal, deep modulation often means a service area of large radius.

But it has very big drawbacks. One of these is that it increases the apparent spread of a station and leads to interference of sideband-splash type with which no receiving set can deal, no matter what its degree of selectivity may be. The depth of modulation is limited by the Lucerne Agreement, but some stations are not playing the game.

How the Batteries Fare

THE good-quality triple-capacity battery which is undergoing the 10-milliamper

test at four hours a day is putting up an amazing record. It has now done fifty days, or 200 service hours. And here is the astonishing point.

A fortnight ago I mentioned that for the previous sixteen days there had been no appreciable change in the daily starting and finishing voltages. *This still continues.* For thirty days now this battery has given a reading of 108 volts under load when first switched on, and 103.8 volts just before it is switched off four hours later.

These figures show that a 10-milliamper load is well within the compass of the battery, all losses being made good by the depolariser during the rest period, and depolarisation being so good under load that the drop in four hours is only 4.2 volts.

The Five-bobbers

AND here is the first week's record of the two five-shilling 120-volt batteries, which are being run under a 7-milliamper load six hours a day for eleven weeks to see whether the claims made by readers for such a service can be substantiated in the laboratory.

On the seventh day of the test, Battery A started at 114.8 volts under load and finished after six hours with a reading of 103.2 volts. The figures for Battery B were: starting voltage, 115.2; ending voltage, 104.

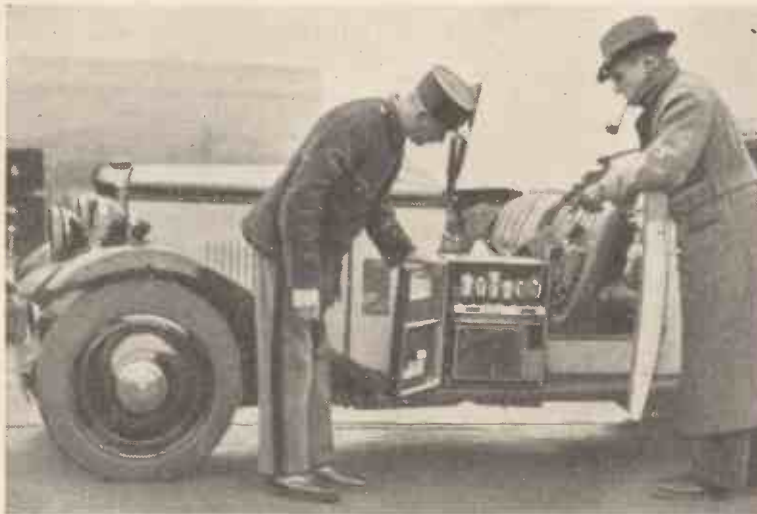
Note particularly the very big drop which takes place between the beginning and the end of the run. Battery A showed a fall of 11.6 volts and Battery B a fall of 11.2 volts.

Distortion Or—!

UNLESS the user is content with end-of-the-evening distortion, he would have to reduce the grid bias on the output valve after about three hours' working (the greater part of the fall takes place in this period), and this would mean that the current drain would be increased.

Under test conditions the load is continually decreasing as the voltage falls. In actual use, therefore, the battery would show a smaller voltage at switching-off time.

Another point of interest is that during their first week's working each of these batteries has shown a net loss in E.M.F. of about 12 volts.



On its way to give a grand thrill to a European listener this H.M.V. super-hot portable is held up for a moment at the French customs

Whistles from America

SOME time ago I suggested that, with the big increases in power that were taking place in the United States and the extraordinarily favourable conditions experienced for transatlantic reception, the time might come when U.S.A. stations caused trouble by heterodyning those on this side of the Herring Pond. Well, it has come.

The other night I was using a special circuit of a very sensitive kind designed for ultra selectivity. Rather to my surprise, I picked up no less than four American stations between 10 p.m. and 11 p.m. I was able to identify two by their call-signs. They were working in the lower part of the medium waveband, and each of them was responsible for a slight whistle.

The two stations whose call-signs I received were WBZ, which works on 302.8 metres, in between the West Regional and Hilversum, and WCAU on 256.3 metres, in between Copenhagen and Monte Ceneri. The other two were unmistakably American.

If these four stations were received and definitely placed as American, there were probably dozens of others also coming through at the same time, but receivable only as a jumble of heterodynes and therefore unidentifiable. It's proverbially a small world, but heterodynes at a range of 3,000 miles or more really are a bit surprising!

New "Bottles" in Old Sets

A WEEK or two ago I gave you a tip for taming a modern valve when used on the high-frequency side of an old set of the tuned-anode type. New valves used in other positions may also require the exercise of some ingenuity to hold them down.

The trouble is, of course, that the old sets were designed for valves of low mutual conductance or "goodness factor," and that they are apt to go right up into the air when modern efficient valves are used as replacements for worn-outs.

What about the detector? If you stick an up-to-date detector valve of high efficiency into an old set the reaction is apt to go all "goeey." You move the reaction knob slowly to about "three o'clock" and the set suddenly explodes into oscillation with a scream. Hastily you turn it back, but it remains oscillating until almost zero.

Here's a tip that you may find useful. Instead of one grid leak, use two. Connect one straight across the positive and the other to negative. Used in this way, the pair make a potential divider for the positive grid bias. If, for instance, both are of equal value the bias will be 1 volt positive (I am assuming that you are using 2-volt valves), whilst if you make the leak across to positive 1 megohm and that to negative 2 megohms the bias is 1.33 volts positive.

By trying various combinations you can often find something which greatly improves the reaction control and you may be able to adjust it to something like perfection.

On the Low-frequency Side

IN a good many old sets the detector is coupled to the first low-frequency or output valve by means of a transformer of pretty high step-up ratio, and it is more than likely that there is little if any decoupling.

You will probably find, when using a modern valve as a replacement, that you have to decouple the detector, and if there is a first low-frequency stage it will require to be treated in the same way. Should these precautions not prove effective, try putting a resistance across the secondary of the transformer. I cannot give you a value, because it varies from case to case. The only thing to do is to experiment until you find something which gives a combination of decent signal strength plus stability.

Amateur Turns "Pro."

THE East Anglian youngster who achieved a brief spell of national fame by operating Norwich No. 1 and Norwich No. 2 has, I am glad to see, been offered a job by a well-known firm. Though we may not approve of illicit transmitting, we must admit that it shows both keenness and the possession of a considerable amount of technical knowledge.

That young fellow should go far, for he has proved also that he has the courage of his convictions.

Another Pirate

MEANTIME I see that another enthusiast, hailing from Rotherham, was fined by the local beaks a couple of pounds for operating a transmitter which had cost precisely that amount to build. The prosecution admitted that he had shown more than ordinary ability and that he had been able to get into radio communication with amateurs in foreign countries.

This enthusiast made no bones about it. He explained that he could not obtain a transmitting licence because his knowledge of the morse code was insufficient.

I have always thought it rather hard that the ability to send and receive quite a fat number of words a minute should be a condition of obtaining a transmitting licence. There are some people to whom it is almost impossible to acquire proficiency in the morse code, though they are none the less the keenest of the keen amongst wireless amateurs. Wireless owes so much to the amateur that exceptions might possibly be made with advantage in certain cases.

Sets Too Cheap—

SOMETIMES I wonder whether receiving sets are not becoming too cheap. To produce the elaborate receivers that we insist upon nowadays at low prices, overhead costs at the factory have to be pared down to the absolute minimum. Economies must be made, in fact, in every department.

Now, there is just one department in which costs cannot be cut if apparatus is to be reliable, and that is the test-room. But I am afraid that it is here that economies are all too frequently made, for there is no question that far too many defective sets are passed out for sale.

The temptations to the manufacturer are very great, for one of the queer traits of the British public is that it will always buy the cheapest, irrespective of quality. Still, I do hope that our best firms will keep their standards right up to the knocker, even if it does mean maintaining or slightly increasing prices.

—and Components Too Dear

YOU used to be able to save a lot of money by building your own set. Nowadays you can buy almost as cheaply as you can build. One reason for this is that the retail price of components remains pretty high, though the same components in what is called set-makers' form are sold vastly cheaper to the manufacturer.

Take mains transformers, for instance. We are called upon to pay a pound or a bit more for a reliable article. The set manufacturer gets his for from one-quarter to one-third the price.

Then, again, the manufacturer does not pay seven shillings apiece for his general-purpose valves or the prices that you and I must fork out for screen-grids, high-frequency pentodes, or portmanteau valves. I have a feeling that the home constructor is being asked to pay far too much for his components and that the trade would benefit greatly if the gulf between manufacturers' and home constructors' prices were a great deal less wide.

On a Beam Coming Over!

TALKING of publicity, I was pleasantly surprised the other day to get a telephone greeting from an old friend in Australia. It seems that one of the attractions of the Post Office display at the recent radio exhibition in Sydney was the offer of a free "call" over the wireless beam to any visitor who had



"Back again" is the humorous title Collinson and Dean append to this original photograph of themselves. They will, indeed, be back again on the wireless on March 24, in one of their inimitable cross-talk interludes

a friend on the telephone in the Old Country. This is what I call a graceful form of advertising. My compliments to all concerned.

One curious point about the Australian beam service is that at certain times the message goes round the world in one direction, whilst at others it takes the opposite route. Short waves travel better in the dark than in daylight, and so they are always directed over the half of the earth that lies mostly in the sun's shadow.

For instance, a beam message to Australia sent from here in the evening travels eastwards over Europe and the Indian Ocean, whilst in the morning the direction is via America and the Pacific Ocean. Luckily, the change-over is easily effected at the transmitter, the radiators for one direction serving as reflectors for the other, and vice versa.

Broadcast Wavelengths

This week we give details of the principal short-wavers and the European long-wave stations. Next week we shall publish a list of medium-wave transmitters.

Principal Short-wavers

Metres	Kilo-cycles	Station and Call Sign	Country
16.86	17,790	Daventry (GSG)	Great Britain
16.878	17,772	Boundbrook (W3XAL)	United States
16.88	17,775	Hulzen (PHI)	Holland
16.89	17,760	Zeesen (DJE)	Germany
19.55	15,340	Schenectady (W2XAD)	United States
19.68	15,234	Paris (Coloniale) (FYA)	France
19.71	15,210	East Pittsburgh (W8XK)	United States
19.73	15,200	Zeesen (DJB)	Germany
19.82	15,140	Daventry (GSF)	Great Britain
19.84	15,120	Vatican (HVJ)	Italy
25.00	12,000	Moscow (RNE)	U.S.S.R.
25.25	11,880	Paris (FYA)	France
25.25	11,870	E. Pittsburgh (W8XK)	United States
25.28	11,865	Daventry (GSE)	Great Britain
25.32	11,840	Wayne (W2XE)	United States
25.40	11,810	Rome (ZRO)	Italy
25.53	11,750	Daventry (GSD)	Great Britain
25.57	11,730	Hulzen (PHI)	Holland
25.58	11,720	Middlechurch (VE5JR)	Canada
25.63	11,705	Paris (Coloniale)	France
30.0	10,000	Madrid (EAO)	Spain
31.25	9,600	Lisbon (CTIAA)	Portugal
31.26	9,590	Philadelphia (W3XAU)	United States
31.26	9,590	Sydney (VK2ME)	New South Wales
31.297	9,585	Daventry (GSC)	Great Britain
31.33	9,570	Boston (W1XAZ)	United States
31.38	9,560	Zeesen (DJA)	Germany

Metres	Kilo-cycles	Station and Call Sign	Country
31.46	9,530	Schenectady (W2XAF)	United States
31.545	9,510	Daventry (GSB)	Great Britain
31.55	9,510	Melbourne (VK3ME)	Victoria
37.33	8,035	Rabat (CNR)	Morocco
38.47	7,797	Radio Nations (HBP)	Switzerland
38.65	7,765	Kootwijk (PDM)	Holland
42.92	6,980	Oslo (LCL)	Norway
43.86	6,840	Budapest (HATZ)	Hungary
45.38	6,610	Moscow (RW7Z)	U.S.S.R.
45.40	6,593	Bucarest	Roumania
46.66	6,425	Boundbrook (W3XL)	United States
48.86	6,140	Pittsbrook (W8XK)	United States
49.02	6,120	Wayne (W2XE)	United States
49.07	6,110	Halifax (VE9HX)	Nova Scotia
49.15	6,110	Chicago (W9XF)	United States
49.15	6,110	Boundbrook (W3XAL)	United States
49.19	6,095	Bowmanville (VE9GW)	Canada
49.23	6,090	St. John (NB) (VE9EJ)	Canada
49.31	6,080	Chicago (W9XAA)	United States
49.39	6,070	Vancouver (VE9CS)	Brit. Columbia
49.4	6,073	Skalmiebaek (OXY)	Denmark
49.47	6,065	Nairobi (VQ7LO)	Kenya Colony
49.48	6,060	Yberby (W3XAV)	United States
49.48	6,060	Mason (W8XAL)	United States
49.59	6,050	Daventry (GSA)	Great Britain
49.83	6,020	Zeesen (DJC)	Germany
49.93	6,005	Montreal (VE9DR)	Canada
50.0	6,000	Moscow (RNE)	U.S.S.R.
50.26	5,969	Vatican (HVJ)	Italy

Long-wave Stations

Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)
1,107	271	Moscow (RCZ)	U.S.S.R.	100
1,176	255	Oslo	Norway	60
1,224	245	Leningrad	U.S.S.R.	100.0
1,251	238	Vienna (EXP)	Austria	3.0
1,304	230	Kalundborg	Denmark	30
1,345	223	Radio Luxembourg	Grand Duchy	200.0
1,345	223	Kharkov	U.S.S.R.	35.0
1,357	221	Motala	Sweden	30
1,389	216	Eiffel Tower (Paris)	France	8.0
1,415	212	Warsaw	Poland	120
1,442	208	Minsk	U.S.S.R.	35.0
1,500	200	Daventry National	Great Britain	30
1,554	193	Ankara	Turkey	7
1,570.7	191	Konigs wusterhausen	Germany	60
1,613	186	Istanbul	Turkey	5.0
1,639	183	Reykjavik	Iceland	21
1,714	175	Moscow (I)	U.S.S.R.	500
1,796	167	Radio Paris	France	80
1,797	166.9	Lahti	Finland	40
1,875	160	Kootwijk (Hilversum prog.)	Holland	50
1,875	160	Brasov	Roumania	20.0
1,935	155	Kaunas	Lithuania	7

* Will probably be heard testing on another wavelength after broadcasting hours



Many people economise in high-tension consumption by plugging down on their anode battery

HARDLY a week passes without my receiving from some reader an account of almost miraculous performances by some make or other of dry-cell high-tension battery. Whenever I receive such a letter I turn up my laboratory records of that particular battery's performances under test—for during the past two or three years I have conducted such tests on more than a thousand high-tension batteries—or, if it hasn't been tried out, I buy one and proceed to put it through the ordeal by milliamperes.

Liberal Estimates of Service

The conclusion to which I am almost invariably forced is either that my correspondents are very liberal in their estimate of the number of service hours that they obtain or that they regard their batteries as serviceable long after they have qualified for inclusion in the dustbin.

Here is a typical instance. A reader told me that from a five-shilling 120-volt battery he obtained thirteen weeks' service with a set requiring nominally 10 milliamperes and used for not less than seven hours a day.

Before we come to talk about actual tests, let us see what these figures imply. The set in question contains a screen-grid valve, so that if any kind of value is set upon either performance or quality in reproduction it could not possibly be operated with a battery voltage of less than 80. Let us be on the generous side and take it that the average, and not the final, voltage was 80.

Instead of the nominal 10 milliamperes, we will call the average current consumption 6 milliamperes. We find the watts by multiplying the volts by the milliamperes, and the answer is .48.

In thirteen weeks there are 91 days, and at seven hours a day the total service hours works out at 637. We have thus a total of 306.76 watt hours. Call it 300 watt-hours in round figures.

A 120-volt battery contains 80 cells. Dividing 80 into 300 we have 3.75 watt-hours per cell.

Now, a certain eminent firm makes a special point in its advertisements that its 120-volt battery, which costs a good deal more than five shillings, has a guaranteed life of 144,000 milliwatt-hours; that is, 144 watt-hours. This, again, is an 80-cell battery, and the result of dividing 80 into 144 is 1.8 watt-hours per cell.

You can be quite sure that if this were not a first-rate perform-

ance the firm in question would not talk about it in its advertisements. It is actually a particularly good showing for a battery made up of standard-capacity cells. If a battery at five shillings could produce a record more than twice as good it would indeed be a wonder!

Let us see what the milliammeter and the voltmeter had to say about it on the test bench. To begin with, a fixed resistance was made up which took exactly 10 milliamperes from the battery at its full voltage. The current, of course, fell with the voltage as it would do were the battery used for operating a set.

The battery was run not for seven, but for four hours a day, the running period being fixed so that it always had a rest of twenty hours between spells of work. These are far better conditions than would be met with in actual practice.

On the twenty-sixth day the battery was down to 79.8 volts, but, wishing to be as kind as possible to it, I continued the test for a further seven days. The absolute cut-off voltage of 72, or nine-tenths of a volt per cell, was reached in 130 hours. I will not bother the reader with the calculation, but the actual watt-hours per cell worked out at rather under 1.2—a pretty big difference between that and the alleged 3.75, is there not?

The battery proved, in fact, to be just about what one had expected, an article of poor quality, though probably quite as good as could be turned out for the money. If my correspondent really obtains thirteen weeks' service from such batteries at seven hours a day he must be content to put up with, shall we say, just a suspicion of distortion!

Are these cheap batteries bargains? Emphatically they are not, as the test figures show. Twenty-six days, which take the voltage down to a bare 80, are the battery's



Measuring the anode-current consumption of a set in the AMATEUR WIRELESS laboratories

Hard Facts About Batteries

By THERMION

real service life at four hours a day. A simple calculation shows that this means fourteen replacements in the course of a year, at a total cost of £3 10s.

The next point is this. Suppose that you spent twice as much on a first-rate standard-capacity battery, would you get more than double the amount of service from it? I don't think that you would, though you would get very nearly twice as much, and it would be better service, as I will show in a moment.

The truth of the matter is that no standard-capacity battery can economically provide the high-tension current for a set which requires a nominal 10 milliamperes. If you want to save money and at the same time ensure the highest quality in reproduction, operate a set of this kind from a triple-capacity battery.

Enormous Voltage Drops

Now, what was I driving at when I said that you will obtain better service from a standard-capacity battery of higher quality? Just this. During the four-hour runs of the cheap battery one feature that was specially noticeable was the comparatively enormous drops in voltage that took place.

On its first day the voltage fell within a fraction of 10 volts in the four hours. On the tenth day the fall was 8 volts, on the twentieth 11.6, and on the twenty-fifth 8 volts. This means a continual and very serious deterioration in performance, and particularly in the

EDITOR'S NOTE

For some weeks now we have received a great deal of correspondence—some of which has been published—on the merits and demerits of the cheap high-tension battery. As Thermion points out in this article, it is very easy to under-estimate the current consumption of a set, with the result that the user is misled as to what he is actually taking out of a battery.

It is a truism to say that you get nothing in this world which you do not pay for somehow or other. In the case of a radio set and a high-tension battery, you either get good quality at a reasonable consumption—or prolonged life at the expense of quality. You certainly cannot have it both ways.

It has been proved over and over again, by careful laboratory tests, that it is always an economy in the long run to use double- or triple-capacity batteries for any set with three or more valves.

quality of reproduction between the beginning and the end of any evening's listening.

A good-quality battery of standard-capacity size shows much smaller falls, owing to the more efficient action of the depolariser. That's what I mean by better service.

And if you want the best service go in for the larger capacity battery, which will suffer a drop of only 2 or 3 volts between the beginning and end of the evening, and will therefore be able to keep the set right up to the mark all the time.

And now I await the letters that will tell me of a half-crown battery which gives twelve hours' service a day and lasts for a year.

AMATEUR TELEVISION

The B.B.C. and Television

SOME CONSTRUCTIVE CRITICISM—By CAPTAIN E. H. ROBINSON

TO be available to a large public television must be put out on wavelengths which the average listener can use. If these wavelengths are within the present medium-wave band we are confined to 30-line pictures. Even these low definition pictures as at present sent out by the B.B.C., require a frequency band of 13 kilocycles, whereas the transmitter should not really use more than 9 kilocycles if interference with neighbouring stations is to be avoided.

The B.B.C. transmits the television programmes at a time of night when only the youthful and enthusiastic—some ten thousand

much outside visual range. For the B.B.C. to spend money on 120-line pictures is pure waste unless the Corporation proposes to put up a chain of ultra-short wave transmitting stations all over the kingdom.

Now for some possibilities. With the 30-line transmissions as they are what is the objection to sending out a half-hour programme on the London National wavelength, at some hour between 7 p.m. and 10 p.m. four or five evenings a week? London National and Daventry National send out identical programmes. The speech could go out on the long wave and vision on the medium wave. Since all receivers have a wave-change switch the ordinary listener would not suffer and there would be an enormous fillip for television.

Some Future Possibilities

The shape of our present picture is admittedly wrong. It was chosen by Mr. Baird for good and sufficient reasons when television started to become a commercial possibility; but the whole art has so much advanced that the reasons for this particular long-shaped picture are now neither good nor sufficient. As things are at present it would not cost much to change to the standard film ratio of three to four, or, with sound track, slightly less. At the same time we ought to change from vertical to horizontal scanning. There is a possibility that the future of television is bound up with the cinematograph camera and the quick development tank. At any rate we ought to be ready for this alternative to the straight television picture.

Recently, I had a chance of talking over the various problems of television with Mr. S. Sagall of Scopphony, Ltd., and he put before me some fascinating possibilities.

Suppose, using horizontal scanning and a picture approximating to standard film ratio, we used a 40-line picture which, if it were made 50 elements would give 2,000 picture points and at a speed of $12\frac{1}{2}$ pictures per second would require a frequency band of $12\frac{1}{2}$ kilocycles against the 13 of the present system.

This picture size would enable the head and shoulders of two people to be sent out with rather better definition than can be sent out by the B.B.C., but it would reduce the definition of full-length pictures. This, however, would not matter very much at present.

Another possibility is a 35-line transmission with 40 elements and 1,400 picture points. At $12\frac{1}{2}$ pictures per second this would only require a frequency band of $8\frac{1}{2}$ kilocycles. Flicker might be rather bad, however, but by increasing the number of pictures to 15 when the frequency band would go up to $10\frac{1}{2}$ kilocycles, flicker would be less noticeable than it is with our present 30-line pictures.

Mr. Sagall also discussed with me the use of the present amateur wavelengths in the

neighbourhood of 180 metres. As it is impossible for amateurs to use this band whilst broadcasting is going on owing to interference caused to neighbouring broadcast receiving sets, there would seem to be no reason why it should not be used for television between six and eleven at night. If this were done, 60-line pictures could be put out quite easily.

With a ratio of 21 to 18 and with horizontal scanning such a picture would have 5,000 picture points and at just over 16 pictures per second would have remarkably good detail. The frequency band admittedly would be large, some 83 kilocycles, but there seems to be no reason why an international agreement should not be come to for the use of a band below 200 metres of this width, for television only, during prescribed hours.

Good Entertainment Value

The whole technique of receiving on these low-medium waves is thoroughly well understood, and the French experience of 60-line transmission on 150 metres leads to the supposition that with only 500 watts behind the transmitter the range is over 150 miles. The entertainment value of such pictures is very good indeed, and there is no reason at all why plays and variety shows using three or four full-length figures at once should not be



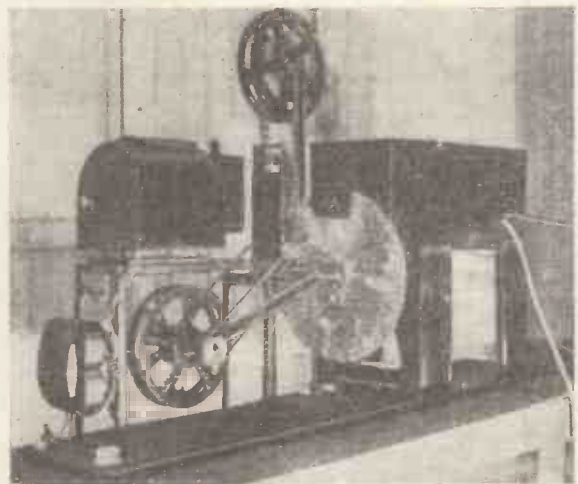
A cheap and simple type of receiver which is very popular; it can be operated from an ordinary wireless set. Full constructional details are given in the March issue of TELEVISION

of them—are out of bed. It complains of a lack of interest, which is not the truth. The interest is there and would be doubled, trebled and quadrupled very shortly if the programmes were at more reasonable hours.

Thirty-line pictures lack definition, but receiving apparatus is now so good that the pictures, particularly head and shoulders pictures, have distinct programme value. These 30-line receivers will become even better if there is any encouragement to commercial firms to improve them.

Television for All

Higher definition pictures, particularly 120-line pictures on which the B.B.C. proposes to concentrate, must be sent out on very short or ultra-short wavelengths. Despite improvement in ultra-short wave transmitters and receivers, consistent reception is not possible



The De France transmitter for 90-line pictures

sent out. Talking films could be transmitted with ease.

These are some of the possibilities. The hard facts are that if television is to progress the transmissions must be on wavelengths receivable by the majority of people, the hours must be within those of normal broadcasting, and television must for some years yet be used as an adjunct to speech and music and not as the main programme item with speech and music as, so to speak, an afterthought. In my opinion it is in the latter particular that the B.B.C. is at present completely on the wrong track.

READ "TELEVISION" AND KEEP UP TO DATE—MONTHLY 1/-



[Photopress photo

The fine amateur transmitting and receiving station, G2YL, owned by Miss N. Corry, of Walton-on-the-Hill, near Tadworth. She has been in two-way communication with fifty-six countries

THE B.E.R.U. tests have just finished. For four week-ends in February amateur pioneers in all parts of the world took part in them.

Do you know what we are talking about? Possibly not. Indeed, it would not be surprising if you had never heard of the B.E.R.U.—much less know what it does and why it tests.

Bringing Fans Together

Well, for a start, the B.E.R.U. stands for the British Empire Radio Union. Its object is to bring together amateur transmitters and receiving fans in all parts of the Empire.

In a sense it is a colonial R.S.G.B. But—we forget; you may not even know what the R.S.G.B. stands for. It is the Radio Society of Great Britain, which has existed since 1913 in order to foster and guard the interests of amateurs keen on wireless.

Perhaps a word or two on the R.S.G.B. would help. Anyone can join, if willing to pay the annual subscription of one guinea for London membership, or 15s. if you live in the country.

Originally, the idea behind this club was to help radio fans with their receiving sets, and to help those with transmitting apparatus to improve their gear. A special section deals with the transmission side of amateur activities and another quite separate section handles reception technique.

For Keen Listeners

Many amateurs who have casually heard of the R.S.G.B. imagine that it is an organisation purely for transmitters. This is quite wrong. It is true that if you have a transmitter the R.S.G.B. in its monthly bulletin will help you to improve it. And that if you want to increase your power, change your waveband, or generally develop your experiments, the R.S.G.B. will back you up in your relations with the Post Office.

On the other hand, if you cannot transmit—or do not want to—and wish to remain

simply a "receptionist," the R.S.G.B. will put your experiments on an official footing.

What very few amateurs realise is that this organisation will allocate to every amateur desiring it an official call sign and number.

The advantages of this idea are very numerous. Take as an example an ordinary short-wave listener in this country who picks up, say, a short-wave transmitter abroad. He sends that distant amateur a report, which is seldom of any great value. As it comes from a private individual it may not receive much consideration. Transmitters receive loads of letters from various parts of the world, and naturally they only answer those framed in a useful way.

Now if the amateur is an R.S.G.B. official



[Photopress photo

Miss Corry has a spell at the morse key! She has communicated with more than thirty amateur stations in Australia and New Zealand

Amateur in W

Since the earliest days of radio transmission and reception. Here and in particular the results of transmitting game and you

receiving station, or what is commonly called a B.R.S. listener—that is a British reception station—the transmitter gives any reports sent to him full attention—especially as the B.R.S. amateur will nearly always give concise information.

Then there is the all-important QSL service. Now you will want to know what QSL means. Actually it has no meaning if you are thinking of an abbreviation. It is used in morse-code jargon to denote a contact between two stations, one of which may or may not be a receiving station.

Take for an example VE3HE, a Canadian station in Toronto. He puts out a test call and is answered by, say, G2KT of Rayleigh, Essex. After they have had a little chin-wag, discussing stations and strengths, they exchange cards—QSL cards—as a confirmation of the contacts made, giving some sort of idea of the station equipment.

As we say, the R.S.G.B. conducts a QSL service, a sort of London clearing house for correspondence between amateurs all over the world. Suppose, for example, G2KT wants to send a card to G2YL. He sends it to the R.S.G.B. and when they have a sufficient quantity from various other amateurs, they are sent in one package to the owner of G2YL.

When G2YL gets all these cards he swaps cards, but instead of posting to each corre-



Another well-known Ham

spondent separately he encloses them all into one envelope and the R.S.G.B. does the distributing.

We ought at this stage to mention that there are clubs of the R.S.G.B. type in quite a number of countries, the most notable being the A.R.R.L., the American Radio and Relay League.

Pioneers Who Set the Pace World-wide Transmission

Radio, amateurs have pioneered the way in both transmitting and receiving. We give a record of recent achievements in this field obtained by Miss N. Corry. There's a lot of fun in this and you can join in even if you have only a receiving set!

From what we have said you can see that behind the amateur movement in radio, not only in this country but abroad, there are organisations of invaluable service to individual amateurs, both for the transmitter and for the receiver.

Let us get back to our opening remarks about the B.E.R.U., the colonial equivalent of the R.S.G.B. It is, of course, run by the R.S.G.B., the idea being to keep all Empire fans in touch.

Amazing Amateurs

About these tests. Amazing amateur performances have been put up during February. When you realise what some of the amateurs have done in contacting each other from vast distances, you will readily agree that it is just silly to decry the short waves.

For example, one transmitter in Scotland has heard over eighty Australian and New Zealand stations in four days. An English station has made contact with an amateur in Peru—over 8,000 miles away.

Just a few of the achievements will convince

amateur stations, and after a time you will get to know the personalities behind the call signs.

Friendships spring up, not necessarily only between two transmitters, but between transmitters and owners of receiving stations. It is all very friendly, really.

Another example of a world-famous station is W1CAA, whose equipment is illustrated in these pages. It is a typical example of a well-designed amateur station. We very frequently correspond with W1CAA—with Lloyd G. Morse, that is—and we swap photographs of each other, our houses, our experiences, conditions in our respective countries, and so on.

A real radio friendship, brought about simply by reporting in the first place on some special transmission.

All sorts of people take a hand in this pioneer radio work. The fair sex is represented, surprisingly enough. But perhaps it is not so surprising. Morse is used a good deal and women are by nature lighter in touch than men. Moreover they are supposed to have more patience—and certainly they have more time to experiment.

No better example of the feminine element can be called to mind than G2YL, whom just now was inadvertently referred to as "he." Actually G2YL is Nellie Corry, living down at Walton-on-the-Hill, Surrey.

She has a station of which many men might be proud. We have just visited it, and typically feminine it is in its wonderfully neat layout. Not an ash tray to be seen, everything just so and every wire get-at-able.

A real object lesson to the untidy male—with his all too common hay-wire outfit hanging together with bits of string.

You might take this girl's experiences as an inspiration. She told us while we were down at Walton that her radio amateur career began when she made up her first short-wave set two or three years ago. She found she could hear Sydney in the morning, South Africa in the afternoon and America in the

evening quite easily. This naturally keyed up her interest in the short waves.

Then G5LA not far away was picked up and Nellie Corry reported upon them in the usual way. G5LA, in the true "ham" manner, offered to show her his station. She went along and saw how it was all done, and came away determined to do the same for herself.

Passing the Morse Code

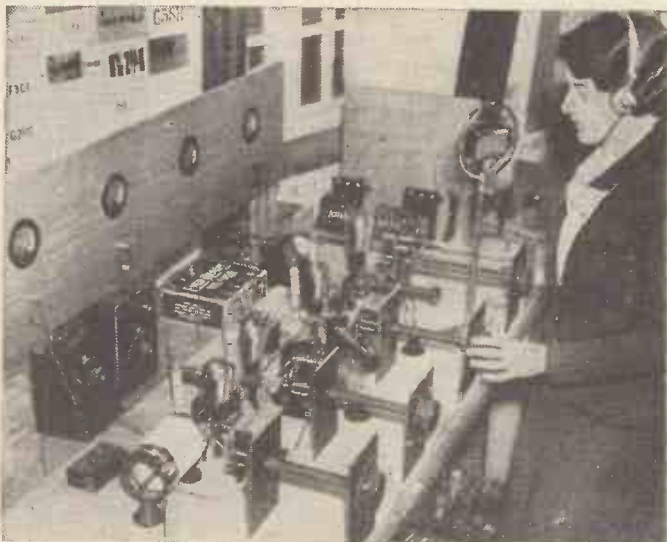
After overcoming many difficulties, such as learning the morse code, and passing the test for twelve words a minute, she got her transmitting licence—and G2YL came into being.

Since then Nellie Corry has entered innumerable contests, and has done amazingly well. In her two years of transmitting she has made over 600 contacts with her station in fifty-six countries. Some record!

Continued on page 328



Typical of American amateur practice—the station W1CAA, owned by Lloyd G. Morse, of Lynn, Massachusetts. His transmissions are on the 20-metre band and are well received in this country by all amateurs.



The whole of this gear was constructed and assembled by Miss Corry herself. She can teach many mere males a thing or two!



[Barratt photo] An amateur transmitter is W. E. F. Corsham. His station has the call sign G2UV

You that these amateurs really are pioneers. Take W9BHT, for example, W. P. Ingersoll of Canton, Illinois, U.S.A. He is on the air, seemingly, twenty-four hours a day—and many listeners in this country must have heard him, particularly on Sunday afternoon, calling up other amateurs in all parts of the world.

You will hear him call up Maracay, Venezuela, or Nova Scotia—and, what is more, get them—just as easily as you might make a local telephone call.

If you tune-in Sunday afternoons on the 20-metre band you will hear numberless



Little-known Ways of Tuning

We take tuning methods very much for granted nowadays but here **PERCY W. HARRIS, M.Inst., Rad. E.** reminds us that there are 'alternative' methods to those usually employed

WE are getting very conventionalised in radio these days. Cost being a major factor in the manufacture of commercial receivers the cheapest, but not necessarily the best, method of doing something is that generally adopted. The condensers, the coils, the chokes, the resistances—all these are very much the same in the modern factory-built set.

But all this must not blind us to the very many interesting and often efficient ways of doing conventional things differently. I have just been examining a number of the latest receivers and, apart from the cabinets which display very considerable ingenuity and variation in design, the chassis are depressingly the same. Look at the shielded gang condensers, for example.

Varying the Frequency

What is the variable condenser there for? To enable the frequency of a circuit to be varied over a sufficiently wide range. Is this the best and most efficient way of tuning such a circuit? From the mechanical viewpoint it may be, but not so from the electrical, as any competent designer will tell you.

Why? Because you keep your inductance fixed and vary the capacity, so that at the bottom of the tuning scale you have your inductance with a minimum of capacity (say .0002 microfarad), while at the top end of the scale you have the same inductance with .0004 or .0005 microfarad. I am being rather generous in my imagined figures because very often the manufacturer does not succeed in getting so low a minimum.

In tuning circuits of this nature you are concerned with the voltages built up across the ends of the inductance, for these are applied to the grid and filament of the valve. The ideal circuit for this purpose has the highest possible ratio of inductance to capacity. This being so the efficiency and sharpness of tuning of the circuit is highest at the lower end of the tuning scale and lowest at the top end. You will see this if you examine the tuning curves of a modern receiver plotted at several points on the scale.

Regularly Published in U.S.A.

In this country the publication of such curves is practically unknown, but in the United States they are regularly published and it is customary to give them at two or three parts of the tuning scale to show their differences. You will be surprised what a big difference this change of inductance-to-capacity ratio effects.

If you want to establish a constancy in sharpness of tuning over the whole range you have two main ways of doing it. You can arrange to have a variable condenser and variable inductance coupled on the same shaft

so as to maintain the inductance-capacity ratio constant over the tuning range.

Or you can have a variable resistance connected on the same shaft as the variable condenser, keeping a fixed inductance, so that as you tune from the top end (where the tuning is flattest) to the lower you gradually introduce more and more resistance into the circuit so as to keep the tuning uniformly flat over the whole range. There may be a few special circuits where this last scheme is practicable but generally speaking it is not a good one.

If you have a variable inductance and a fixed capacity, keeping this latter at a minimum, then you can maintain a reasonably high voltage across the inductance at any point in tuning, but, of course, your inductance-to-capacity ratio will change all the time, in this case the sharpest tuning being at the top of the scale.

Some years ago an apparatus known as a variometer was very popular in American amateur, and for that matter, professional, receiver design. If you have two coils of wire one inside the other, the two coils being in series, the inductance of the inner coil will not only be added to that of the outer one if the two are joined in the right direction, but the interaction of magnetic fields will give the overall total a higher figure than if the two coils are well separated from one another.

If now you reverse the connections so that the field of the inner coil opposes that of the outer the total inductance will be smaller than that of either.

By winding the inner inductance on the surface of a ball-shaped former and by winding the outer inductance in such a way that it comes on the inner side of a second ball-shaped former made to enclose the first and by running a rotating shaft through both, it is possible to make a continuously variable inductance in which the inner former could be gradually moved round from the position of maximum inductance (field helping) to a position of minimum inductance (field opposing).

If such a variable inductance is connected to the grid and filament of a valve there will be a certain amount of fixed residual capacity in the lead between the grid and filament, in the valve holder and so forth which we can consider as a small fixed condenser whereas the variometer as it is called acts as a continuously variable inductance.

In this scheme a very high inductance-to-capacity ratio is maintained all the time, but the trouble with it is that while the wire is being fairly efficiently used at the maximum inductance position the same amount of wire is used for the position of minimum inductance whereas about a quarter of that wire would be quite enough to give the same inductance for the minimum position if you were using fixed coils.

Another earlier tuning method was to attach an efficient variometer with not too big an inductance range (therefore not too much wasted wire) on the same shaft as the variable

condenser so that both capacity and inductance were increased or decreased by turning. Properly designed this scheme was quite efficient but mechanically it was awkward and expensive.

Finally I want to refer to a very old but nevertheless quite efficient means of tuning, which might well be revived for certain kinds of work in these days. Its virtues will be self-evident when I explain the scheme. As originally made it consisted of two parallel cylinders both with grooves cut in them, the grooves being of such a shape and thickness as to allow a coil of flexible copper wire to be wound in them with just sufficient spacing between turns to prevent them touching.

Shifting the Wire

One of these cylinders was made of insulating material and the other of metal and they were so placed on bearings with handles that the wire could be smoothly and continuously wound from one cylinder to the other.

As you will have noticed from the description so far given, so long as the wire is on the insulating cylinder it will form an inductance, but as it passes on to the metal cylinder the inductance is progressively removed from the coil and the wire makes perfect electrical contact with the cylinder everywhere.

If now this metal cylinder is connected to earth and filament and if the other end of the coil on the insulating cylinder is connected to grid you will see that we have a continuously variable inductance in which only just that amount of wire is used to give the inductance needed!

Using modern skill, experience and technique it should be possible to make a grooved low-loss former of high efficiency and to design such a continuously variable inductance for receiving purposes in a good, sound, mechanical way. For a short-wave, wide-range tuner with the minimum of switching this method should be ideal.

Inside a Metal Cylinder

It should be possible, for example, to place the insulating former inside a completely closed metal cylinder, making the former travel along a threaded rod in such a way that the wire comes through the shielding cylinder (making contact with it) on to the former, giving a very high efficiency screened coil of a very considerable tuning range.

The wire could be suitably bobbined in any manner after it emerged from the casing as it would be "dead" electrically having been shorted on to the shielding at the point at which it emerged.

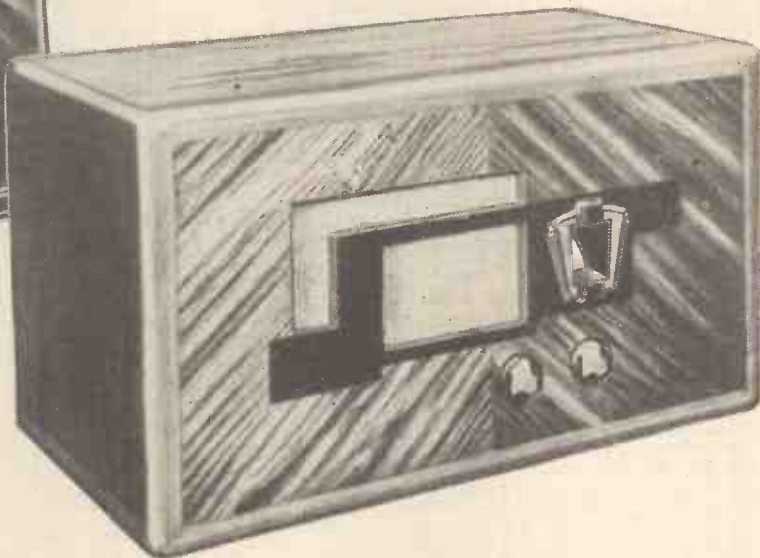
There are several other methods of tuning other than by variable condenser, such as the "spade" tuning, which Marconi's used in their early valve broadcast receivers and variable-core tuning, which may again become important in radio now that we have high-efficiency iron cores for radio frequencies.

But I think I have told you sufficient to show that the variable condenser is neither inevitable nor essential

Two great battery SKYSCRAPERS



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complete receivers
**FACTORY BUILT &
FACTORY TESTED!**



'SKYSCRAPER' ALL-WAVE-ALL-WORLD 4*

Kit of parts complete with valves £5 12s. 6d.

Kit, as above, with cabinet and loud-speaker, £8 2s. 6d.

Or complete factory assembled and factory tested receiver, with valves, loud-speaker, H.T. and L.T. batteries in cabinet, £9 15s. 0d.

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Kit of parts complete with valves, £8 17s. 6d.

Kit as above with cabinet and moving-coil speaker, £11 10s.

Or complete factory built and factory tested receiver, with valves, loud-speaker, H.T., and L.T. batteries, in cabinet, £13 13s.

For two years now the name "Skyscraper Radio" has echoed round the world wherever home-constructors meet. The mighty power, the vast range of these "Skyscraper" receivers was a new experience for everybody, and happy home-constructors boast that no commercially-built set can equal the "Skyscraper" they have built themselves.

Now at last the man who is NOT a home constructor can have his "Skyscraper Radio." So insistent has been the public demand for a ready-built "Skyscraper" that Lissen have decided to put the "Skyscraper" sets through those same factory processes which make commercial receivers so absolutely reliable. To-day the All-Wave All-World "Skyscraper" 4 and the "Skyscraper" 7-valve Superhet are available as complete receivers—factory assembled and factory tested. They have retained the all-but-magic distance-getting properties of the home constructed receivers, they have not lost

one iota of their power, they are sold complete with batteries, valves, accumulators, loud-speaker and cabinet—ready for all the family to use and to thrill over.

If you own a "Skyscraper" you know that you own a receiver which has been developed to the limit of range and power—you can get no better set in its class than the "Skyscraper" of your choice! Ask your dealer to show you "Skyscraper Radio," either as a kit of parts for you to build with your own hands, or as a complete receiver, factory built and factory tested.

LISSEN LIMITED, WORPLE RD., ISLEWORTH, MIDDLESEX

LISSEN

All Lissen "factory built and factory tested" Skyscrapers carry a label to this effect.

Skyscraper Radio

Advertisers Appreciate Mention of "A.W." with Your Order

THE ADVANTAGES OF USING A BLUEPRINT

If you want to make your set construction as simple as possible use one of the full-size blue-



prints in the "A.W." range. Here are ten really sound practical advantages of using a full-size print

1.—No matter what set you intend building, there is a blueprint in the "A.W." range showing full constructional details of just the outfit you require. That is one of the advantages of the "A.W." Blueprint Service. There is a full-size constructional sheet produced for every set introduced in "A.W." When you read the constructional descriptions published week by week of the fine sets designed by the "A.W." Technical Staff you have the assurance that you can build each one of them up with the aid, not only of the published photographs and descriptive matter, but that there is a full-size blueprint, showing the whole layout and wiring. It means that no matter whether you contemplate a simple crystal set or one-valver, or a big super-het, or mains receiver, you have the full service of the "A.W." Technical Staff behind you. The blueprints are prepared in conjunction with the sets.

No Guessing Necessary

2.—You do not have to guess at a set's specification when ordering a blueprint. A comprehensive list published each week not only classifies the prints under the headings of the various set types—crystal sets, one-valvers, twos, threes, and so on—but, in addition, a code analysis of the circuit is given so that you know the basic layout of the set.

For instance, the blueprint for the Class-B 3 has order No. A.W. 386, and the specification of the circuit is shown as "D. Trans. Class B." This signifies a straight-forward detector stage with transformer coupling and class-B amplification. The "Up-to-the-Minute Three" in a similar fashion is shown as having a circuit comprising "S.G., Westector, L.F. Trans." This shows that the set incorporates a screen-grid stage, a Westector detector, a low-frequency stage, and a transformer-coupled power stage. So you see there is no guesswork about choosing a print from the "A.W." list.

3.—The blueprints in the "A.W." series are prepared engineering prints photographically reproduced on stout paper. They are not

printed copies on thin paper which will not withstand the handling a print is bound to get during the job of building up the set. Considering the high quality of the print, the price is very reasonable, and you will certainly save the cost of the print in the ease with which you make up your set. Each sheet on which the blueprint is photographically reproduced allows a wide margin so that it can be folded or cut and easily be used as a template.

4.—In the prints for conventional sets consisting of a baseboard with a vertical panel, the top of the baseboard and the reverse side of the panel are shown so that by simply bending the print up into position you can see at once the space taken by the set and you can form a very good idea of the general component arrangements. In conjunction with the published photographs, this is a really valuable help as you can see what the finished set will look like, and you are not working in the dark.

5.—Wiring is usually reckoned to be the most difficult part of the construction of a set, but if you work from a full-size blueprint you can see where each lead goes. In many cases it is possible to gauge the exact length of the wires. This applies particularly to leads which connect parts on the same plane. Of course, the draughtsmen in preparing the blueprints always show the leads as clearly as possible, and you can see at a glance the point-to-point connections, judging afterwards, if necessary, the exact length of each wire to connect between the terminals.

6.—Every wire on the blueprint is numbered, and it is always recommended that the consecutive order of numbers be followed when you start your wiring. No matter how short a lead may be, it is given a number showing

that it is included in the general wiring scheme. Rigid wires, battery flexes, and short bare leads are all numbered, and if you follow the numerical order, you can be sure of not missing a lead.

7.—In nearly every constructional article it is stressed that the "A.W." blueprint, being full-size, can be used as template and mounting guides. If you are in doubt about the layout of the panel, you can bend the print over the edges and prick through the drilling centres to make sure that each part is in its correct position. In metal sets, when you want to make your own chassis from sheet aluminium, this is invaluable, and even in wood and ebonite sets it means a great saving of time. You can plot out the baseboard positions and drill the panel without any guesswork.

8.—After completing your set and before switching on it is advisable to check over the component mounting and wiring. Here a full-size blueprint simplifies what can be otherwise an irksome job. Each component and lead can be checked off on the print as its actual counterpart in the set is checked as O.K.

Special Cabinets and Frame Aerial

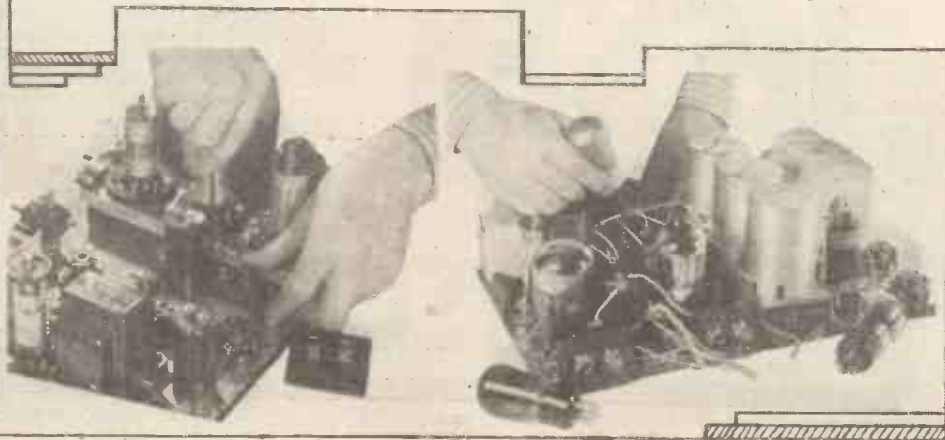
9.—Some sets are not finished even when the panel and baseboard wiring is complete. There may be a special cabinet to be built up or a frame aerial to be wound. These are always shown as dimension sketches on "A.W." prints, and in the case of frame-aerial construction, dimensions and wiring details are given so that, from the print alone, without any constructional description, you can wind your own frame.

10.—The "A.W." blueprint service is unique. A huge stock of prints is always kept at the "A.W." Blueprint Department, and postal or personal orders are given urgent attention. Postal orders and not stamps should be sent with each application, and it is advisable to quote the number of the blueprint required (obtainable from the list published each week in "A.W."), and not the number of the issue.

Blueprints, of course, are sent by return of post and post paid. You will find it will pay you to get in touch with the "A.W." Blueprint Department, 58-61 Fetter Lane, E.C.4.



Three stages of set construction in which you find many practical advantages in using a blueprint. (Left) After the correct positions have been ascertained from the print, the baseboard parts are screwed down and the panel drilling begun. (Centre) The print is an invaluable guide while you complete the baseboard layout and wiring. Each lead is numbered on the blueprint, so that you cannot miss out a connection when wiring up. (Right) Here is the complete set all ready for its first try-out after the blueprint has been used to check over the connections





The Pilot Kit SERVICE was founded in 1919

27/6 LUCERNE MINOR 39/6 LUCERNE RANGER

PILOT AUTHOR KIT EXACT TO SPECIFICATION



See the PILOT on the carton. It's a real guarantee.

BARGAIN PHILCO 5 VALVE BALANCED SUPER-HETERODYNE

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All Electric; seven tuned circuits with single dial control. Gives amazing performance with new economy in operating costs. Duo wavelengths; no leak between bands. Illuminated dial, no reaction; chassis and tuning condenser floating on rubber. Overize, energised M.C. Speaker with large baffleboard gives exquisite, full tone. Beautiful cabinet in Walnut and Oriental woods with rich inlays. Height, 39 1/2 in.

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TELSEN S.G.3 KIT, less valves. Cash or C.O.D. Send Carriage Paid, £1/19/6. Balance in 9 monthly payments of 4/6. **4/6**
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complete with switch-controlled multi-ratio input transformer. Cash or C.O.D. Carriage Paid, £2/2/0. Balance in 7 monthly payments of 5/9. **5/9** only

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NEW ROLA CLASS-B PERMANENT MAGNET MOVING-COIL SPEAKER AND AMPLIFIER.

Complete with Valve and Input Transformer. Two models: A for PM2B, PD220 and 220B; B for 240B and HP2 (state which when ordering). Cash or C.O.D. Carriage Paid, £3/11/0. Balance in 11 monthly payments of 6/6. **6/6** only

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Assemble this amazing Unit yourself in less than half an hour. Gives seven times the volume with mains quality from your existing battery set. Complete Kit comprises B.V.A. Class "B" Valve, Peto-Scott Permanent Magnet Class "B" Moving Coil Speaker, B.R.G. Driver Transformer, seven-pin Valveholder, Peto-Scott Baffle and Baseboard Assembly, all necessary Wires, Screws and plug-in Valve Adapter, with full-size Diagrams and Assembly instructions. **55/-** Carriage Paid. Or send only 6/- Balance in 11 monthly payments of 5/-.

NEW BLUE SPOT 99 P.M. PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with tapped Input Transformer. Cash or C.O.D. Carriage Paid, £2/19/6. Balance in 10 monthly payments of 6/-.

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Complete with input transformer. Send only 2/6; balance in 5 monthly payments of 4/-. Cash or C.O.D. Carriage Paid, 19/6. **2/6** DOWN

ANY ITEM SUPPLIED SEPARATELY

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Author's Kit of First Specified Parts, including Metallised Baseboard and wood for Panel, 10 in. by 7 in., but less Valves and Cabinet. Cash or C.O.D. Carriage Paid, £17/7/6. Or Yours for 4/- Balance in 7 monthly payments of 3/9.

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Packing and Carriage, 2/6 extra.

LUCERNE RANGER

(For detailed list of Parts see our previous advertisement)

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CASH OR C.O.D. Carriage Paid **39/-**

Comprises the Kit of Parts as detailed, less Valves, Cabinet and Speaker. Cash or C.O.D. Carriage Paid, £1/19/0. Balance in 11 monthly payments of 3/6.

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in place of parts for same, add 5/- to Cash or C.O.D. Prices, or 6d. to each monthly payment.

PILOT AUTHOR KIT CONTAINS

1 Metallised baseboard	1 0
1 H.F. choke kit as "A.W." February 3	1 6
1 Lucerne aerial coil kit, as "A.W." January 27	2 6
1 .0002-mfd. fixed condenser	6
1 .0003-mfd. fixed condenser	6
1 .1-mfd. condenser	2 0
1 .0003-mfd. variable condenser, with S.M. drive	5 0
1 .0003-mfd. reacton condenser	2 0
1 .0003-mfd. pre-set condenser	9
1 4-pin valve holder	4
1 3-pin valve holder	8
5 Wander plugs as specified	7 1/2
2 Grid terminals	4
2 Terminal blocks with terminals	1 0
1 15,000-ohm resistance	7
1 1-meg. resistance	7
2 Strips of Wood, 8 in. by 1 in.	8
1 2-point shorting switch	7 1/2
1 3-point shorting switch	10 1/2
1 L.F. transformer kit, as described in "A.W." February 10	3 6
Wire, screws, etc., and wood for panel 10 in. by 7 in.	2 0
KIT "A." CASH or C.O.D. Carriage Paid	£17 7 6

VALVES.—1 Detector valve, 7/-; 1 low-consumption pentode, 16 6. **1 3 6**

LUCERNE COILS

Complete kit comprising 2 ready-drilled Formers, 2 Basis of enamelled Wire, 6 B.A. Terminals, Nuts and Screws. Exact to specification for Aerial or Grid Coil. Postage 6d. extra. **2/6**

Ready Wound

LUCERNE AERIAL COIL AND GRID COIL Per Pair **6/6**

Wound exactly to "Amateur Wireless" specification. Made in a factory, Tested and Guaranteed by Peto-Scott. Postage 6d. extra on single coils. Post Free

H.F. CHOKE PETO-SCOTT KIT, comprising former, ready drilled, complete with terminals, fixing screw and 44 enamelled wire to "Amateur Wireless" specification. **1/6** Postage 6d. extra. Ready assembled and tested by Peto-Scott. postage 6d. extra. **2/6**

L.F. TRANSFORMER PETO-SCOTT KIT, comprising moulded bakelite case, ready-drilled and completed with ready-wound bobbin, 25 pairs of laminations and terminals, 10 "Amateur Wireless" specification. Postage 6d. extra. **3/6** Ready assembled and tested by Peto-Scott postage 6d. extra. **5/-**

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Sets of the Season Tested

Cossor Model 435

THERE is a lot to be said for straight three-valve receivers even though the super-het is gaining in popularity. A straight receiver with an efficient high-frequency stage often has a better daylight range than the smaller type of super-het, although the selectivity may not be quite so good.

On the other hand, for those who require only a moderate number of stations at both good quality and volume, a receiver such as the new Cossor 435 cannot be too strongly commended. This receiver, which has just been generally released, is supplied in a massive oak cabinet of severe design. It is of



Back view of the Cossor Model 435 receiver, an excellent three-valver

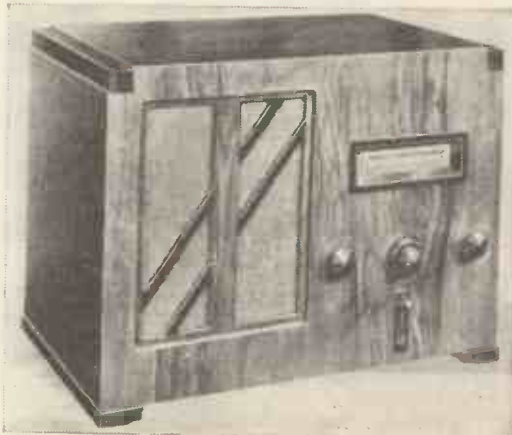
the horizontal table type and houses, the energised moving-coil loud-speaker, receiver chassis and mains pack.

The cabinet work is unusually good, the finish and polish being above reproach, and you need to bear in mind that the price is but £9 15s.

The controls on the front of the cabinet are quite normal. On the left-hand side is the volume control, which varies the grid-bias supply to the variable- μ screen-grid valve.

This control also embodies the master on-off switch, which comes into operation when the volume control is turned to zero.

This volume control is very smooth and gradual in action. We mean that signal



Note the attractive appearance of the modern cabinet of this Cossor receiver

strength can be varied very gradually; it does not, like some controls, only come into operation after about two-thirds of its travel. On the right-hand side is the simple reaction control. This is merely a signal booster.

In the centre is the master tuner, and concentric with this knob is a trimmer across one half of the double-gang condenser which enables you to keep the two tuned circuits in accurate resonance, so as to obtain the maximum signal strength and selectivity.

The tuning dial is calibrated in wavelengths from 200 to 550 metres on medium waves and 900 to 2,000 on the long waves. The wave-change switch is of the lever type and is situated beneath the tuning dial, long and short waves being marked on the bakelite cover.

An interesting feature in this receiver is the unique method of tuning. Instead of having a movable metal indicator, an oval light moves up and down the tuning scale with a horizontal movement and illuminates either the top or bottom half, according to whether the long or medium waves are in use. This oval is just large enough to illuminate a complete set of figures, so that tuning is absurdly easy.

The moving-coil loud-speaker is of the energised type and is fed by a power pentode (type MP/Pen) which gives approximately 2 watts output.

Selectivity is adequate for all normal requirements. Approximately three channels were lost either side of the local station at a distance of 30 miles with an aerial of 60 ft. in length. One notices an entire absence of top-note cut-off which would not be expected in view of the selectivity. Apparently

IN A NUTSHELL

Makers: A. C. Cossor, Ltd.

Model: 435.

Price: £9 15s.

Valve Combination: High-frequency stage (Cossor MVSG), high-frequency pentode detector (Cossor MS/Pen), power pentode output (Cossor MP/Pen), and full-wave valve rectifier (Cossor 442BU).

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

Type: Self-contained table model.

owing to the fact that the detector valve—a high-frequency pentode—is resistance-capacity coupled to another pentode, the high-note response is maintained.

As is to be expected with a receiver of this kind, the quality is extremely good, while local interference, such as noisy light switches, is not experienced. It is claimed that this is due to the use of resistance-capacity coupling as against transformer coupling.

Provision has been made for the use of external loud-speakers and a gramophone pick-up, while if you should have an electric gramophone motor the power supply for this can be obtained from two sockets at the rear of the chassis, so that you will not want an adaptor or separate power point.

During a daylight test Radio Normandie, Hilversum, Berlin and Langenberg, etc., were heard at full loud-speaker strength and with less background noise than with the usual super-het. Indeed, one of the most outstanding features of this receiver is the exceptionally silent background even when the reaction control is almost at maximum.

After dark an average log of between thirty-five and forty stations could be obtained and by judicious use of the volume and reaction controls selectivity was always adequate. As value for money this set is without parallel, while for family use it will give excellent results and from past experience we can say that it should be extremely reliable.

Our Tests of New Apparatus

New Iron-core Coil

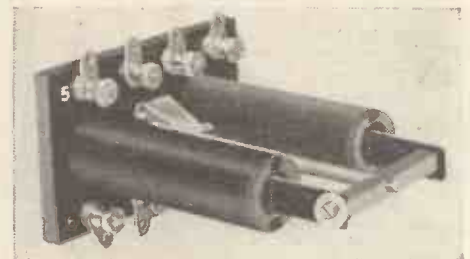
IN the new Varley Bifocal Focussing Coil the high-frequency iron core does not completely fill the interior and is capable of being moved about (within limits) inside the coil former.

This arrangement, combined with a carefully selected aerial tapping point, enables the aerial coupling to be altered smoothly without affecting the tuning. Only very slight alteration of tuning is required when the coupling is varied from minimum to maximum, giving quite a wide variation in selectivity.

The use of Litz wire for the medium-wave winding ensures a fairly efficient coil, despite its small diameter and a high-frequency resistance of 8 ohms at 1,000 kilocycles is quite good for a coil of this description. The long-wave coil is wound with ordinary silk-covered wire.

An excellent feature of the coil is the wide wave ranges covered with a standard .0005-microfarad condenser. The medium-wave range extends from below 200 metres to 580 metres, and on the long waves the range is from 990 to 2,150 metres.

The reaction is smooth, and a practically constant coupling capacity produces oscillation from one end of the scale to the other. The reaction condenser should be connected between anode and the reaction coil.



The Varley Bifocal Focussing coil, a new tuner with a special iron-core arrangement

The chief utility of this coil should be in circuits of the detector-low-frequency type having only one tuned circuit, where its flexibility of control is a great advantage. The price is 10s. 6d. and the makers are Varley (Oliver Pell Control), Ltd., of 103 Kingsway, London, W.C.2.

THOSE readers thinking of the Lucerne series of sets will be interested in the news that another firm has decided to market the special Lucerne coils designed for modern conditions by "The Experimenters." McDaniel & Co., Ltd., of 178 Mawneys Road, Romford, can supply Lucerne coils wound and ready for use in your set at a cost of 6s. per pair, post free, or 3s. each, postage 6d. extra.

WHAT SET IS YOURS?

● FOR EVERY SET ON THE MARKET THERE IS A SUPER-LIFE GROSVENOR BATTERY

For instance is yours a

KOLSTER BRANDES

There is a Super-Life Grosvenor for every Kolster Brandes Model. Ask your dealer.

- KOLSTER BRANDES K.B.247 Pup. Ask for Grosvenor DBA546 (99+7½ v.) ... 10/-
- KOLSTER BRANDES Hika Trans. S.G.4. Ask for Grosvenor DBA546 (99+7½ v.) ... 10/-
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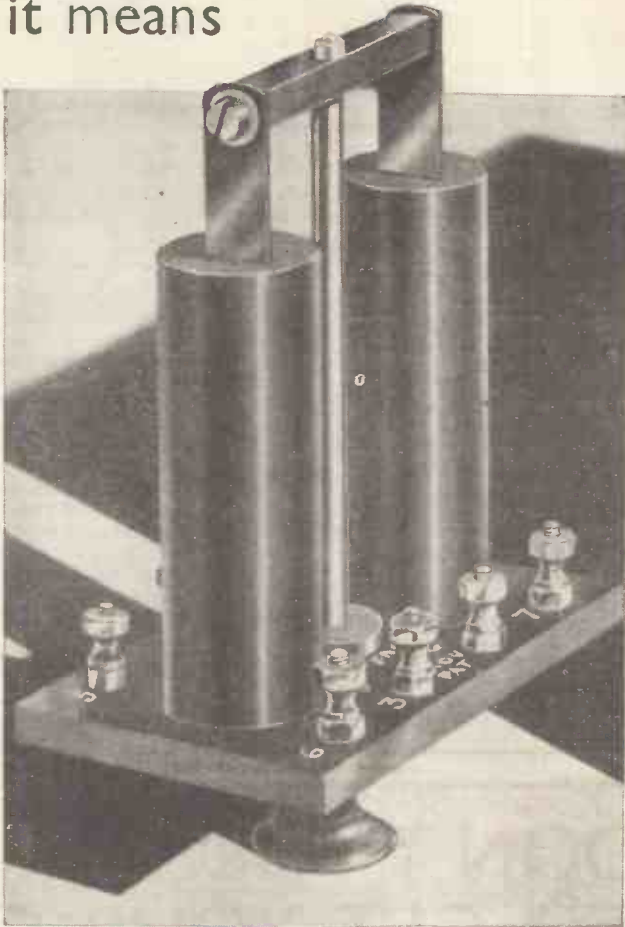
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What's New in Radio

SERVICE engineers and dealers will be interested in the Weston set analyser. With this instrument tests of valves can be made under working conditions and measurements of voltage and current (A.C. and D.C.) can also be made. The voltage range is from 5 to 1,000 and the milliampere range from 2.5 to 500. Resistance measurements up to 500,000 ohms can be effected, the exciting battery being contained in the unit.

The current taken for full-scale deflection on any range is only 1 milliampere.

Provision is made for measuring characteristics of seven-pin valves and adaptors are supplied for four-pin and five-pin types; other adaptors suitable for any valves are available. This means that measurements can be made on American-type valves and receivers.

The instrument and accessories, including the numbered diagrams of valve types and corresponding switch positions, pack into a neat carrying case. The price is £15 15s.

Another Cossor Melody Maker has been added to the existing range. This new receiver is the model 340. A variable-mu screen-

grid and detector feed a triode output valve, the Cossor 220P, which, used in conjunction with a sensitive moving-iron loud-speaker, gives adequate output for normal purposes.

Provision is made for electrical reproduction of gramophone records through the low-frequency side of the receiver, the plug-and-jack method of connection being used. This receiver is, of course, one of the kit range and the price (complete with cabinet and loud-speaker) is £5 7s. 6d.

Car-radio enthusiasts will be interested in the new receiver introduced by British Radiophone, Ltd. It is a four-valve super-het capable of receiving both medium- and long-wave stations. Models will be available for 6- or 12-volt car-lighting circuits.

Good reception is claimed from foreign stations such as Hilversum, Radio Paris and Luxembourg. It is also claimed that all problems of electrical interference from the usual channels have been surmounted.

The aerial can be hidden in the roof of the car or the new metal covers for spare wheels can be used. The receiver is fitted to a bracket which requires only a

single nut and bolt for fixing, and electrical connection to the car battery is made with a single plug.

The tuning condenser and coils are actually housed in the control box, thus eliminating troubles due to extended control cables. The receiver is only 9½ in. wide by 6 in. deep. The consumption is 42 watts and the undistorted output is 2 watts. Complete with aerial and suppressors, the price is £25.

Much time and temper will be saved by using Sharr's screw, nut and bolt setters, manufactured by F. J. Sharr, of Radley's Lane, South Woodford, London, E.18. These consist of a square tube through which slides a square bar to which is fitted jaws to grip the bolt—or screw to be manipulated.

To grip a nut or bolt the bar is pushed down, thus expanding the jaws. The setter is rotated by means of a knurled disc and a stop is fitted so that the bar cannot be completely withdrawn; thus parts cannot be lost.

It is claimed that 8BA nuts can be picked up from a tray and set in position at the rate of eight a minute without any threads being crossed. Samples we have received are 6 in. long and cost 2s. 6d. each, but they can be supplied in lengths up to 24 ins.

A handy four-in-one screwdriver is manufactured by Muller



The new Weston set analyser

and Co., Ltd., of Sphinx Works, Chase Road, Park Royal, N.W. 10. The four screwdrivers fit one inside the other, the largest forming the case and having a small brass cap covering the end of the blade. They can therefore be carried without fear of making holes in the pocket.

This gadget will be useful to all radio fans, for a screwdriver is always in demand for odd jobs. The price is 2s.—excellent value considering the good quality of the tools.

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Just look at this splendid list of contents in Friday's issue:—

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- At Home with the **CARLYLE COUSINS**
- Searching for B.B.C. Talent by **JOHN TRENT**
- A to Z at the B.B.C. by **GODFREY WINN**
- Etc., Etc.

Take a copy home with you on Friday, your family will enjoy it too!



RADIO PICTORIAL

TAKE A LOOK AT THE CONTENTS OF MARCH "WIRELESS MAGAZINE"

<p>FOR THE CONSTRUCTOR</p> <p>The Lucerne Super. Short-wave Adaptor for Your A.C. Set. Wireless Jobs Made Easy for Mr. Everyman. The £3 3s. Three.</p> <p>TECHNICAL FEATURES</p> <p>How to Use the High-frequency Pentode. A Chat on Real Quality. A.C. Meters for the Experimenter. A New Television System. Superhets for Television.</p>	<p>GENERAL ARTICLES</p> <p>Guide to the World's Broadcasters. World's Broadcast Wavelengths. CUQ Calling. Deep-sea Doctoring by Radio. Radio on 17 Centimetres. Midnight Adventures with the Super 60. Those Broadcast Humourists! Radio Luxembourg. Finding the Way by Radio. Foreign Programmes for the Kiddies. News of the Short Waves. 1933 Economy S.G. Three.</p>
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AND GET A
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THE LUCERNE MINOR—Continued from page 308

its right voltage all the time, thanks to the use of a 15,000-ohm resistance in its anode circuit. This cuts down the voltage to a suitable value for smooth reaction, and acts as decoupling at the same time.

Valves are not critical, but don't start experimenting with high-impedance detectors—use the suggested low-impedance type, such as the PM2DX. The pentode is of the small type as specified, but you can, of course, go in for a larger one if you can afford the extra high-tension drain.

To operate this little set is child's play. The centre knob works the tuning condenser, the little knob on the left is for wave changing—pushed in for long waves and pulled out for medium waves—the knob on the right is for reaction, and finally the knob underneath the tuning control is the master switch.

Use Reaction—With Discretion!

You will find it easy to log the locals on this set, even with reaction near zero. But use it with discretion, and it will help you to bring in plenty of stations. Don't forget that the coil has an exceptionally wide tuning range, Fécamp, for example, coming in at about 28 degrees, London National at about 40 degrees, while at the other extreme Athlone comes in at about 162 degrees.

A final word to make the most of the tuning coil's flexibility. Do spare a few moments to

experiment with the ten turns on the aerial winding. If you are quite satisfied with the selectivity but want more volume, perhaps another turn or two will do the trick without losing selectivity. If, on the other hand, you are getting more volume than you really need and are suffering through lack of selectivity, try taking off a couple of turns—it is amazing what a difference this simple alteration can make.

And that's the Lucerne Minor. So long, now, we are rather busy testing the Major.

In our test report on the T.M.C. Hydra condenser in the March 3 issue of AMATEUR WIRELESS, the last paragraph suggested that it might be an advantage to add a damp-proof sealing to the top of the condenser, owing to the possibility of moisture affecting the insulation. From J. G. Flint, chief engineer of the Telephone Mfg. Co., Ltd., we have received the following comment: "We do not rely upon the bakelite terminal plate on the condenser to prevent the ingress of moisture to the condenser unit. Our condensers are embedded in a bitumenous sealing compound and it is upon this material that we rely for preventing the penetration of moisture to the unit itself. For this reason we do not consider that the provision of an alternative design of the top will improve the resistance of our condensers to the effects of moisture."

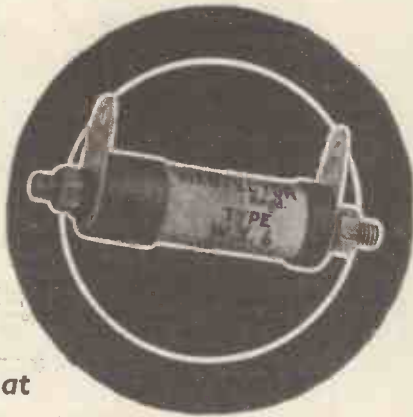
Makeshift Aerials For Indoors

INDOOR aerials do not necessarily have to be slung. Anyone with an electric-light supply has a ready-made aerial that will pick up the powerful foreigners quite well. All you need is a small fixed condenser of .0001-microfarad capacity between the aerial terminal and one side of your mains—try both. Don't forget the condenser should be of the high-test voltage type—500 volts working will do nicely.

Another makeshift aerial can be obtained by winding a short length of flexible wire round your telephone lead, thus making use of the telephone conduit and connecting it to the set by a form of capacity coupling.

A variation of this indoor aerial is to make a circular copper plate say 6 in. in diameter, join the lead-in wire to it, and stand it beneath the telephone base. This works surprisingly well but of course it is not a patch on the well-erected indoor wire round the room or in the loft.

If you prefer a more orthodox arrangement and would like a slung aerial, use a short wire of not more than 50 ft. total length. This can be either thin stranded wire or single d.c.c. wire, as used for coils. But do keep it short! You will then keep down the capacity effects that so often reduce aerial efficiency. M.H.



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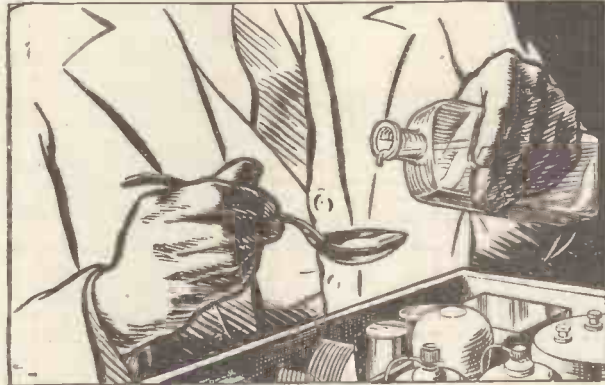
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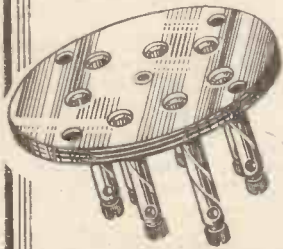
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The Long-wave Conference

By JAY COOTE

ALTHOUGH not yet officially released, the decisions taken at the recent Geneva Conference of the International Broadcasting Union are gradually leaking out and it is already possible to judge of the results which may accrue from the meeting.

So far, the greatest successes have been achieved by Radio Luxembourg, Kootwijk and Lahti to whom, with the exception of the first named, within one kilocycle of the channels they had themselves chosen are to be conceded to them. It was inevitable, of course, and by this *beau geste* the International Broadcasting Union has secured their co-operation in assisting to make the long-wave band a more peaceful home for the other European transmitters.

New Radio Paris Wavelength

Apparently France will receive satisfaction, inasmuch as Radio Paris will leave the 1,796-metre channel and take up a new position on 1,648 metres (182 kilocycles) between Konigswusterhausen and Moscow, the latter being removed by 1 kilocycle. Whether it will be necessary to make an adjustment for Reykjavik does not seem to have been made clear, but it would certainly appear to be the case if the power of its broadcasts is in any way increased.

It is probable that Warsaw, if given the option, will elect to choose the 224-kilocycle channel for its permanent position, namely, 1,339 metres, as this would give a fair separation from Radio Luxembourg and Motala, which would operate on 1,389 metres (216 kilocycles).

Bear in mind, if you look at a wavelength list, that you must eradicate Eiffel Tower from this channel which eventually, if these decisions are adopted by the powers that be, will entirely disappear from the long-wave band, as promised, to operate on 206 metres. But Radio Luxembourg, as a neighbour, will have Kharkov on 1,293 metres (2 kilocycles away) and Warsaw on 1,339 metres (6 kilocycles). Minsk may work on 1,442 metres (208 kilocycles), between Daventry and Motala.

An Improvement?

Although not ideal in practice, there is no doubt that this change-over will effect an improvement, at least temporarily; it is too early to say whether it will be workable for any period of time as the proposed increase in power of some of the transmitters may, when carried out, upset all calculations. So far, Ankara and Istanbul are to keep to their present frequencies.

If the plan is adopted, Kootwijk and Brasov will again share a wavelength, 1,887 metres, within 1 kilocycle of the old Dutch channel; to date neither has complained of interference. As, however, the Rumanian station may develop into more than 100 kilowatts in the near future, it is quite on the cards that another shift may have to be made at a later date. Kaunas, to give the necessary separation, would move up to 1,948 metres.

Generally speaking, with the exception of a few persistent sinners, stations on both medium and long wavebands are maintaining their positions fairly accurately. Exceptions found, as hitherto, are mainly confined to the French private transmitters which, for some reason or other, have always been guilty of wide deviations.

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Criticisms by WHITAKER-WILSON

My Broadcasting Diary

Sunday

NEARLY didn't listen to-night, but thought I must hear Tom Jones for the last time at Eastbourne. Don't care where he comes from next so long as he comes.

Mavis Bennett superb. Nothing less. Lovely top notes. Wish to goodness there were as much echo in the studios as at the Grand. Silly nonsense, all this artificial deadness.

Monday

WHO'S afraid of the B.B.C.? Not Mr. Ferrie, evidently.

Heard Carroll Gibbons. Thought he played his pieces better than he need have. Drivel all of them. If he plays that well, why not play something worth hearing?

Some of that *Radio Racket* wanted re-stringing. Not so bad, perhaps, taking it as a whole. Very well produced. Nice and slick.

Tuesday

AJ. ALAN intrigued me, amused me, and ended by annoying me. Don't mind settling one or two points for him, but jib at a dozen. Think the B.B.C. ought to make him finish his job. What do they pay him for?

About that pond, for instance. . . .
Oh, very well . . . if you know. . . .
You would.

Wednesday

IN early this afternoon. Found Henry Hall on the air. Then he stopped. Thought he was protesting because the B.B.C. had subbed his script, but heard afterwards the transmitter had blown up or something. Very careless.

The Two Leslies a scream. Don't care how often I hear them.

Many thanks to Christopher Stone for introducing me to Cab Calloway, Esq. So that's scat? *Oh, Cab!*

Wireless Military Band really good. A smart lot.

By the time Walton O'Donnell has had them another year there won't be a military band in the country to touch them for tone and precision. Very enjoyable.

Thursday

QUARRELLED with *Quarrel Island*. When the same author wrote *Waterloo* he wrote an excellent scene depicting Napoleon's state of mind on the island of St. Helena. It was a brilliant scene.

In *Quarrel Island* he simply took that scene and made three out of it. They snapped all Act One. They snapped all Act Two. They snapped all Act Three. In Act Four there was nobody to snap. Napoleon died.

Much too long. An hour and a half for a play you can't see, and which has very little action, is forty-five minutes too long. *Quarrel Island* could have been a success in a reasonable form. There were moments in it.

Friday

LISTENED to Sir Oliver Lodge with profound interest and respect. A great man and a great scientist. *Do we survive?* A great subject. Most of us have views on it. Sir Oliver was definite at all events. Must say I found myself agreeing with much of what he said?

Well, if we can survive jazz and scat-singing we ought to survive altogether!

Saturday

TOO thirsty to wait tea for Charles Brewer till half-past four, but heard his second *Tea Mixture*. Thought it even stronger than the first. Dora Palmer was very funny.

Advise you not to miss these shows. I shan't until Charles serves me up a bad one. Don't think he will, though.

To-night's *Music-Hall* tip-top. Tessie O'Shea sang splendidly. Songs very jolly. She carried St. George's and radio audiences together. Good broadcasting.

Layton and Johnstone charming. Never more so. I liked *You're Shy* and *By the Waterfall*. Both really artistic, and so delightfully rhythmical.

Henry Hall must change his studio at Broadcasting House. His band sounds so much better in St. George's. Just what I have always said. Those studios no good for music. Much too dead. Dance Orchestra to-night and this afternoon—well, no comparison!



[Keystone photo

Cab Calloway and his Cotton Club Orchestra on their arrival at Southampton. They certainly seem to be full of pep!

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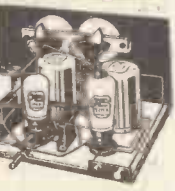
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INFORMATION BUREAU

Will every querist please observe the following revised rules?

Please write concisely, giving essential particulars. A fee of one shilling, postal order (not stamps), a stamped, addressed envelope and the coupon on this page must accompany all queries.

Not more than two questions should be sent at any time.

The designing of apparatus or receivers cannot be undertaken.

Slight modifications of a straightforward nature only can be made to blueprints. For more serious alterations the minimum charge is 2/6.

Blueprints supplied by us will be charged for in addition, but of course, readers may send their own blueprints for alteration.

Modifications to proprietary receivers and designs published by contemporary journals cannot be undertaken. Readers sets and components cannot be tested by us. Queries cannot be answered by telephone or personally. Readers ordering blueprints and requiring technical information in addition should address a separate letter to the Information Bureau and should see that their remittance covers the price of the Blueprint and the amount of the query fee.

We do not answer queries in cases where the fee is omitted.

Queries should be addressed to the Query Dept., "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.

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.

Belling Lee Accessories

READERS who possess a radio receiver and a portable gramophone can convert these to a radiogram with the addition of a Belling Lee clip-on unit pick-up. The unit embodies a volume control mounted conveniently on the side. This is one of the numerous accessories manufactured by this firm. The full range of their plugs, sockets, and terminals are, of course, included. You should have this catalogue for reference. **151**

Comprehensive Loud-speaker List

A COMPREHENSIVE range of loud-speakers are described in the latest catalogue of Blue Spot. An excellent permanent-magnet model is the 29PM, which can be supplied without transformer for use with sets equipped for extension loud-speaker. This model can be supplied as a chassis or complete with cabinet. For mains sets there are the energised models, priced at 27s. 6d. The four-pole balanced-armature unit and unit chassis are also included. **152**

Amateur Pioneers who Set the Pace in World-wide Transmission

Continued from page 317

She has spoken to operators in Australia, Finland, and Portugal, to army officers in Egypt, people in Palestine—in fact, the entire world seems to be on her doorstep. She showed us her snap album, comprising photographs of foreign amateur stations.

Lest you should imagine that Nellie Corry's work has entailed a lot of very expensive apparatus, let us hasten to tell you that all her equipment is completely home built, and the whole of her contacts have been made with a power of 20 watts or less. She has now been granted a high-power licence, so no doubt she will soon add to her laurels.

Just one more example of what the amateurs can do. Mr. Shrimpton, who went out from Middlesex to Dunedin, Australia, erected a short-wave transmitter, and amongst others got into contact with GzLZ one of our most prominent stations. Since the first contact over a year ago these two stations have not missed a single morning to send each other a few words across the world. Twelve thousand miles—and as regular as clockwork. More so, clocks stop—they don't!

We have talked about amateur radio at large. Summed up, our message is simple. We want to impress upon you that you may be a potential world-girdler—but your wireless knowledge may be put to a most thrilling use.

We are not suggesting that everyone interested in wireless can become a transmitter. Appreciable knowledge, time and money are needed for that. But even if you never do transmit you can most certainly join in the world-wide amateur fraternity, and so really help in furthering the experiments that for ever engage the attention of pioneer amateurs.

In spite of the extremely bad atmospheric conditions during the monsoon season, radio in India is becoming very popular. The troubles in connection with atmospheric are being rapidly overcome. Philips Electrical Co. are doing much in this direction, and we understand that Philips have supplied the largest percentage of receivers.

TRANSMITTING VALVES.—Mullard, Marconi 6-volt, new, in makers' cartons, 2/9, post free.—H. Woodcock, 1 George Street, Grantham.

YOU CAN USE YOUR SPARE TIME to start a Mail Order Business that quickly brings you a full-time income. Few pounds capital only needed; no samples or outfits to buy. No rent, rates or canvassing. New method makes success certain. Send P.C. to-day for booklet.—Business Service Institute, Dept. 371A, 6 Carmelite Street, E.C.4.

"UNIVERSAL" RADIO BARGAINS. Stamp for our Huge Bargain Lists of Components, Kits, Sets.—"Universal," 20 Victoria Road, Peckham, S.E.15. New Cross 4933.

IF YOU WISH to save money and make money, send stamp for our lists of amazing Radio Bargains. Keen Quotations for Components, Kits, Sets.—Radiovision Supplies, 94 Grove Vale, East Dulwich, S.E.22

BANKRUPT BARGAINS.—New Goods. List free ST300 kit 35/-. ST400 45/-. ST500 52/6. 3 v. 17/-. Lucerne Ranger 20/-. Just in. Celestion PPM19 21/-. Marconi 1034 2v. sets with valves 30/-. Lotus 3 gang 10/6. Polar 2 gang 7/6. Majestic 4v. A.C. Super-het 25/2/6. Igranite Iron cored coils. Oscillator and 2 LF 10/-. Igranite Imfids. 1/6. 2 mfd. 1/8. A.C. and Universal mains sets at right price. Part exchange. All the smaller lines. Keenest prices.—Butlin, 143B Preston Road, Brighton. Preston 4030.

FULL-SIZE BLUEPRINTS

When ordering, please send Postal Order, NOT STAMPS. Quote the Blueprint number shown below: not the number of the issue.

THREE-VALVE SETS (1s. each)

Everybody's Home Radiogram (SG, D, Trans)	AW381
S.S.3 (A.C.) (SG, SGDet, Pen)	AW390
"Up-to-the-minute Three" with Class B, 1/6.	AW384B
Class-B Three (D, Trans, Class B)	AW386
A.C. Triodyne (SG, D, Pen)	AW399
Home-built Coil Three (SG, D, Trans)	AW404
Fan and Family Three (D, 2LF)	AW410
£5 5s. S.G.3 (SG, D, Trans)	AW412
A.C.-D.C. Universal Three (SG, Det, Pen)	AW414
1934 Ether Searcher (SG, Det, Pen) Baseboard	AW417
1934 Ether Searcher (SG, Det, Pen) Chassis	AW419
Lucerne Ranger (SG, Det, Trans)	AW422
1933 Economy S.G. Three (SG, D, Trans)	WM306
A.C. Calibrator (SG, D, Pen)	WM309
£6 6s. Radiogram (D, RC, Trans)	WM318
Simple-tune Three (SG, SG Det, Pen)	WM327
Tyers Iron-core Three (SG, SG Det, Pen)	WM330
I.C.B. Three (D, L.F., Class B)	WM333
Economy Pentode Three (SG, D, Pen)	WM337
Three-range Three (SG, D, Pen)	WM336

FOUR-VALVE SETS (1s. 6d. each)

"A.C. Melody Ranger" (SG, D, RC, Trans)	AW380
"A.W." Ideal Four (2SG, D, Pen)	AW402
"Words and Music" Radiogram (2SG, D, Trans)	WM307
"Words and Music" Radiogram de Luxe (2SG, D, Q.P.P.)	WM307a
Home Short-waver (SG, D, RC, Trans)	WM311
Empire Short-waver (SG, D, RC, Trans)	WM313
Merymaker Super (A.C. Super-het)	WM345
1934 A.C. Quadradyne (2 SG, D, Pen)	WM349
Lucerne Straight Four (SG, Det, Trans)	WM350
Home-lover's New All-electric 4 for A.C. mains (SG, D, Trans)	AW383
Melody Ranger (SG, D, RC, Trans) with copy of "A.W." 4d. postage	AW375
Signpost Four (SG, D, L.F., Class B)	AW398
Table Quad (SG, D, RC, Trans)	WM303

FIVE-VALVE SETS (1s. 6d. each)

James Short-wave Super (Super-het)	AW328
Simple Super (Super-het)	AW340
The Etherdyne (Super-het)	AW406
1934 Century Super (5v. Super-het)	AW413
Class-B Quadradyne (2SG, D, Class-B)	WM344

SIX-VALVE SETS (1s. 6d. each)

New Century Super (Super-het with copy of "A.W." 4d. post free)	AW363
1934 A.C. Century Super (Superhet)	AW425
James Super-straight Six (2SG, D, L.F. Push-pull)	WM339

SEVEN-VALVE SETS (1s. 6d. each)

Super Senior (Super-het)	WM256
Seventy-seven Super (A.C. Super-het)	WM305
Q.P.P. Super 60 (Super-het)	WM319

PORTABLES (1s. 6d. each)

General-purpose Portable (SG, D, RC, Trans)	AW351
Midget Class-B Portable (SG, D, L.F., Class B)	AW389
Holiday Portable (SG, D, L.F., Class B)	AW393

AMPLIFIERS (1s. each)

Universal Push-pull Amplifier	AW300
"A.W." Record Player (L.F. Push-pull)	AW319
Battery-operated Amplifier	AW362
"A.W.'s" Push-push Amplifier	AW376
Class-B Gramophone Amplifier	AW391
Universal A.C. Amplifier (3-valve)	AW411
Five Q.P.P. Output Circuits	WM315

MISCELLANEOUS (1s. each)

"A.W." Trickle Charger	AW352
Add-on Band-pass Unit	AW359
Short-wave Adaptor for New Century Super	AW367
Plug-in Short-wave Adaptor	AW382
Three Class-B Units	AW403
"A.W." Television Receiver	AW431

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of most of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine." Address letters:

Amateur Wireless Blueprint Dept., 58-61 Fetter Lane London, E.C.4

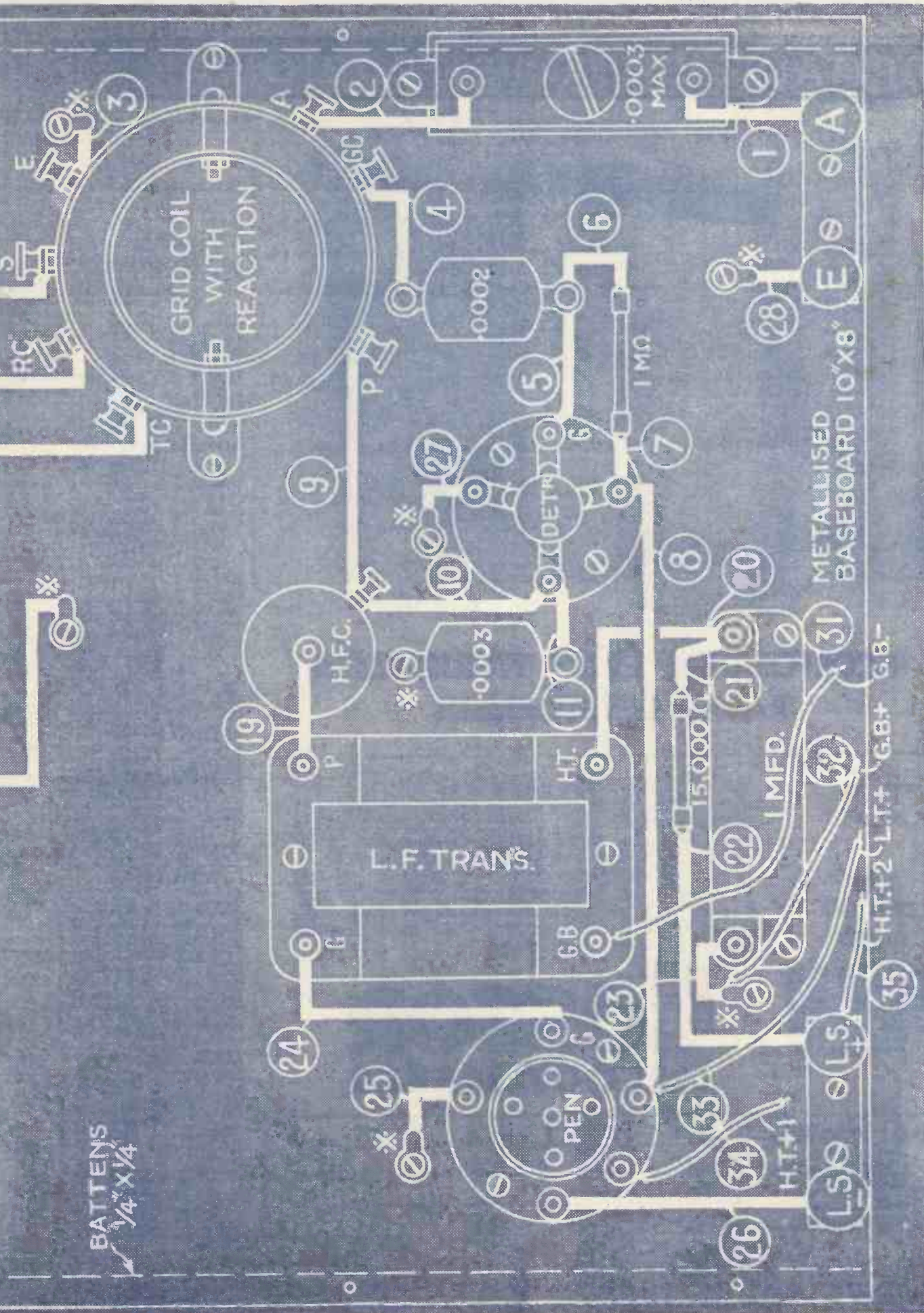
Amateur Wireless

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News and Gossip of the Week

"Bottling" at Tatsfield

NO, we don't mean that the B.B.C. engineers down at the Kentish listening post have gone all rural. They aren't bottling milk but programmes.

They have just picked up the recent Mussolini speech via the Rome 25.54-metre short-wave station. And picked it up so well that they have been able to Blattnerphone it.

Picking up Roosevelt

YES, and that's not all. These boys have a long arm—they have picked up Roosevelt's latest report to the American nation, this time through W2XAD and W8XK, two of the best-known short-wave relays in the States.

They even tried to pick up Japan direct—when the Emperor of Manchukuo was crowned, but they ended by taking this interesting event from one of the American stations.

Trade-union Talks

DIE-HARDS may possibly foam at the mouth and indict lengthy screeds to the newspapers when they hear the B.B.C. Talks Department's latest plan—to bring speakers to the microphone to explain and discuss the trade-union movement.

Walter Citrine and other prominent trade unionists will be heard in this spring series. They will, perhaps, work it all up into a centenary affair—for just a hundred years ago, you know, Dorset labourers were tried and convicted for illegally banding themselves together.

St. George's For Ever?

COLOUR is lent to our query by the B.B.C.'s decision to lease the now famous hall for another year after next September.

When the Saturday-night music-hall series ends next month, the B.B.C. will take the chance to re-seat the place—and those select people who vociferously "clap hands" will do so in the acme of comfort.

Taking the Veil!

AN awful last-minute rush has developed at the B.B.C.'s Clapham research branch. Engineers are frantically turning out all the treasured junk in readiness for the great move.

By the time you see this, they will be in their new headquarters—the late Convent of the Sacred Heart.

Forgive the crack, but it is irresistible—they will draw a veil over their future work, not take it.

Television Times

AS we hinted, the B.B.C. has decided to broadcast one of its bi-weekly television programmes in the morning. As from April 3, there will be a half-hour programme from 11 to 11.30 a.m. on Fridays. The other programme will be from 11 to 11.30 p.m. on Tuesdays.

Not enough, the cry will go up—and we shall echo that. Don't be so mean, B.B.C.—give television the break it needs.

Malcolm Frost Back

BACK from a tour many young men would like to do—a tour of 60,000 miles, sailing the seven seas, crossing the five continents—by air, rail and steamship, our Imperial broadcasting ambassador, Malcolm Frost, returns as a mature and knowledgeable man.

He will pass on his vast store of facts to the Empire Service at Broadcasting House—to the ultimate benefit of millions of overseas kinsmen.

Big Empire Costs

TALKING of the Empire service, the B.B.C. has shortly to face a very large expenditure on the erection of new-type elevated masts for the Empire transmissions from Daventry.

Two 350-foot masts are already up—harbingers of a revolution in Empire broadcasting technique. Louder signals and greater reliability are the anticipated results.

Pleasing Gesture

IN the talks studio used by the Prince of Wales, the B.B.C. has just erected a placque of His Royal Highness.

This is particularly appropriate because it is made by the Ashtead potters—part of that army of ex-service men whose cause the Prince has so devotedly espoused.

Val Gielgud Speaks

COMING to the surface for the third time from his inundation of letters, Val Gielgud has now had time to survey his sea of troubles.

Listeners have been very kind—have shown by their 10,000 letters that they are now "sold" on radio drama.

They like actuality plays. Want

more, they say. Val will give them more.

The South Sea Bubble, the Spanish Armada, Marie Antoinette, and the events around August 4, 1914—these are some of the subjects he has in mind for future treatment.

Programme Changes

AFTER Droitwich—what? Many changes in the programme make-up, believe you us. There will be late alternatives to the dance music, with quintets, orchestras and plays.

Then that glaring 11-to-12 noon programme gap will be filled—they know not what with as yet.

A special committee is now sitting to decide on this weighty question. Housewives, mostly concerned with this hour, please help the B.B.C. programme people to decide!

And Television?

JUST a faint stirring, too, about television developments. Nothing definite as yet, but we would not be surprised to hear of a more forward policy in the autumn.

Manifestly, the present proposals for twice a week on medium waves is absurdly meagre. Especially as the much-talked-of high-definition television is on the ultra-shorts.

These B.B.C. "Attacks"

MOST ordinary listeners must be wondering what all this newspaper campaign against the B.B.C. really means. Very little of the criticism is constructive. A lot of it is pure sensation-mongering.

Of course, influential people may be moving behind the scenes to end the present Charter. But they are self-interested—caring nothing for listeners' needs.

Welcome, Schoolboys!

THIS issue, as promised, is dedicated to schoolboys—to our many juvenile fans who now have the glorious prospect before them of three or four weeks' freedom.

Make the most of your good fortune, chaps! Build the short-waver on pages 333 and 334—or start from the bottom with our efficient crystal set—or look into Percy W. Harris's amazing "breadboard" set on pages 340 and 341.



Ekco photo

Jack Payne and his boys lend a critical ear to tuning a radio set during an interval at the Paramount, Manchester



Fox photo

Did anyone say headphones? Well, here are some for the use of passengers on the L.N.E.R. Scottish express

ALTHOUGH, in general, headphone reception does not claim to compete with the loud-speaker, there are still quite a number of listeners who stoutly prefer the crystal-clearness of the older instrument. And, judging by the performance of some of the loud-speakers one occasionally hears, there is something to be said for this opinion.

But apart from any question of volume and quality, there are times when a pair of headphones offers the most appropriate and convenient means of enjoying the broadcast programme. For the hard-of-hearing, for instance, they are often definitely more satisfactory than a loud-speaker.

Useful Late at Night

One can also use them late at night—or with a bedside set—without disturbing the rest of the household; and there are various other occasions when the clarion voice of the loud-speaker may be distinctly out of place.

Considered as a useful accessory, it is rather surprising that headphone construction has not kept better pace with the improvements made in other radio appliances. Perhaps the fact that they "came in" with the early crystal set is enough, in the eyes of the manufacturer, to condemn them to "go out" with it.

But these "old timers" often return to favour, when the occasion arises (as witness the super-het circuit) and we may yet see the headphones staging a "come-back"—in a suitably improved form.

The old type of headband support is one definitely weak point to which inventors might turn their attention. It is heartily disliked by the ladies, bobbed or otherwise, and by most men, too, chiefly on account of its exasperating habit of extracting a few hairs—often when they can be ill-spared—every time the phones are donned or taken off.

From this point of view there is something to be said in favour of the well-known idea of inserting a pair of earpieces in the centre of a soft pillow, against which one can lay one's ear and listen in comfort. At one time the slumber pillow "notion" was advocated as a cure for insomnia—the patient apparently being lulled to sleep at night by music from the Mayfair Hotel!

This may or may not be so much "blah," but the arrangement has at least the merit of being comfortable.

New Ideas in Phone Reception

Revealed by MORTON BARR

Another alternative is to "bed" the earpieces in the upholstery of an easy chair—preferably inside one of the headrests—where they are sufficiently "padded" to allow one to recline against them in comfort, and yet close enough to the surface to permit of "individual" reception.

A good deal of attention has been given to "earpiece design" in connection with appliances which are designed to assist the deaf or hard-of-hearing. The usual equipment for this purpose consists of a microphone, placed near the loud-speaker, and an earpiece worn by the sufferer.

The more up-to-date type of instrument usually includes a thermionic amplifier for increasing the normal level of sound as required, and a volume control operated by the listener to adjust it to "comfortable" strength.

As the earpiece may have to be worn for several hours at a stretch it is obviously important that it should be as light and comfortable—and also as inconspicuous—as possible.

In some cases the receiver is made so small that it will fit comfortably inside the opening of the ear, a light supporting-clip being provided to take over the lobe of the ear if necessary. In other types the electromagnetic unit is "backed" by a small extension piece which is anatomically moulded to engage with the external convolutions of the ear so as to hold itself in place.

In both cases the weight of the actual receiver is transferred from the most sensitive part of the ear to a part which can support it without inconvenience. At the same time the appliance is so designed as to be hardly noticeable when in position. These are both desirable features when it comes to producing a "better" headphone for broadcast reception.

So long as there is an amplifier in circuit

with the earpiece, it is possible to use quite a small electromagnetic unit and still get adequate volume. Naturally, however, the quality is improved if a larger diaphragm is used, particularly if it is operated by a moving-coil movement.

Another possible line of attack is suggested by the fact that the outer ear is not the only channel through which sound can reach the brain.

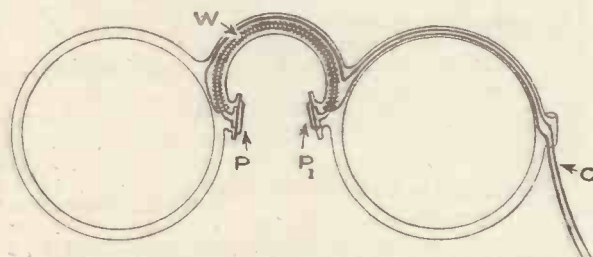
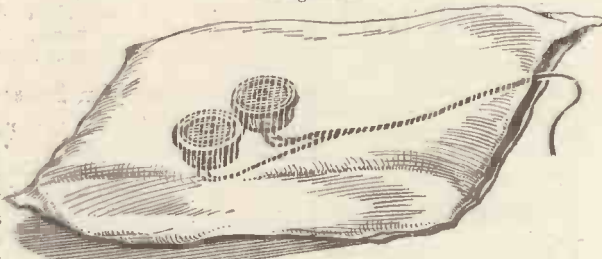


Fig. 2.—Pince-nez "phones," similar to the spectacle arrangement



The old type of "cushion" headphone

For instance, if vibrations are applied to certain parts of the head, such as the temple or cheekbone, or to points near the bridge of the nose, the sounds are conducted through the bony structure of the skull to the middle or inner ear, and are then heard just as distinctly as if applied directly to the ear in the first place.

The ingenious appliance shown in Fig. 1 takes the form of a pair of spectacles or pince-nez, and is obviously intended more as an aid to a person who is hard-of-hearing than for listening-in to the broadcast programmes. But it is of interest as showing what can be done in this direction.

The electromagnetic unit consists of a magnetic wire *w* inserted inside the rim of the glasses, and energised through a finer winding *s* with speech currents from a microphone pick-up. The magnetic wire ends in a pair of flattened pole-pieces *P*, *P*₁, Fig. 1a, which transfer the sound vibrations to the nasal bone and from there to the middle ear. The connecting wires from the pick-up enter the lens-frame through the usual suspending cord *c* as shown in Fig. 1b.

In Fig. 2 the magnetic unit is confined to the bridge, directly over the nose, and is fed by two thin wire leads which can be passed through rims of ordinary size.

The possible improvements in headphone design are numerous and we may yet see a return to this type of listening in the near future.

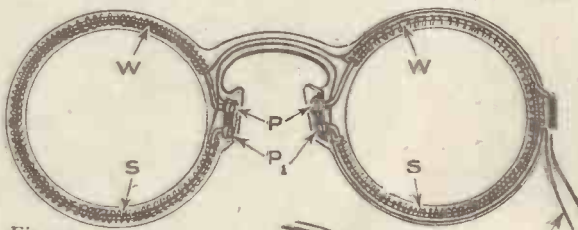


Fig. 1a

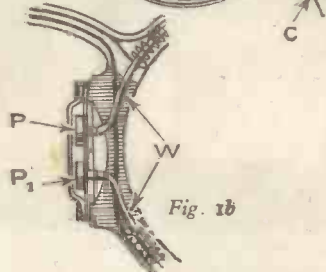


Fig. 1b

TELL YOUR FRIENDS ABOUT THIS SPECIAL SCHOOLBOYS NUMBER IT IS FULL OF GOOD THINGS!

Figs. 1a and 1b.—Arrangement of ingenious "spectacle" phones

Sir John Reith Replies to His Critics

A Complete Vindication of the B.B.C.'s Policy—and a Personal Triumph

ATACKED from all sides of the popular press, Sir John Reith has hit back with a vigour that ought to silence ill-informed critics for a long time.

Before a meeting of 150 Conservative M.P.'s he laid his case with impressive ability and engaging frankness. Having explained the aims of the B.B.C., of which he is, of course, the Director-General and virtual chief, he invited questions on every aspect of the broadcasting service—and he asked the members not to mind being personal.

Preliminary Explanations

In his preliminary ten-minute address to the meeting he ably outlined the constitution of the B.B.C., defended its present policy, explained its programme aims, and touched upon the technical difficulties of broadcasting.

Followed thirty-five minutes of close cross-examination by the members of Parliament. Their questions ranged widely, showing that they were determined to find out whether any of the recent allegations of the popular press were true—allegations as to the "iron-handed" administrative rule, the lack of contact with listeners' programme wants, undue censorship of the talks, wrong distribution of the licence revenue, and a host of kindred matters of great listener moment.

Sir John was ready for all these questions. So ready that his succinct replies completely satisfied his interrogators.

A Hundred Thousand Letters a Year

On the subject of keeping in touch with listeners, Sir John explained that the B.B.C. received roughly 100,000 letters a year, most of which were of a congratulatory nature.

The B.B.C. was satisfied if it pleased seventy-five per cent. of the listening public—if it could do that it was doing all that was humanly possible. *To please the greatest number most of the time was the B.B.C.'s ambition.*

Political broadcasts, Sir John told the meeting, were given in such a way that opponents of both sides of any question were

given a hearing, or a single person gave an impartial review.

Sir John repeated the original explanation for the Ferrie affair, saying that the "cuts" in the working man's talk were made because of their irrelevancy to the subject, and not for any other reason.

In future, foreign affairs broadcasts—which have lately been the cause of some discussion—would probably be drawn from a specially constituted panel of speakers. Some of these would speak from foreign capitals.

Dealing with the questions relating to the B.B.C.'s income, Sir John reminded members of a significant point already made clear to our readers in a recent issue—that the Corporation receives only 4s. 6d. from every 10s. licence fee. The Government had the rest, "in one form or another."



[Daily Express photo]

Inquisitive people who pass by the house of Sir John Reith at Beaconsfield are not welcome—as these large iron gates expressively testify



Sir John Reith, Director-General of the B.B.C., in smiling mood—as he must have been after his triumphant vindication of B.B.C. policy at the recent parliamentary meeting

During the questioning of the Director-General there was a dramatic incident. The point arose as to staff discipline and Sir John, by way of reply, handed to the chairman of the meeting, Mr. W. S. Morrison, a testimonial of personal loyalty from 800 members of the B.B.C. staff.

We happen to know that this was an entirely spontaneous expression of goodwill from those at Broadcasting House. The idea came to a woman member of the staff, who drew up the testimonial, went round the offices collecting names, and personally delivered the list of signatories to Sir John Reith's office not long before he left for Westminster.

It was a complete vindication of the stories that have been appearing

in some quarters about staff "revolt" at Broadcasting House.

The impression created upon the members by Sir John's frank answers to all their questions was most decisive. Many afterwards, stated that their confidence in the working of the B.B.C. had been completely restored. There is no doubt that Sir John scored a personal triumph. But it was more than that, for he was defending not merely himself, but the executive staff of Broadcasting House as a whole.

No Select Committee

As a result of this meeting, it is very unlikely that members of Parliament will again raise the question of a select committee of inquiry into the B.B.C.'s Charter.

Indeed, Sir Kingsley Wood, the Postmaster General, has already said: "As the Charter granted to the B.B.C. has nearly three years to run it would, in my opinion, be premature at the present time to consider the appointment of a committee of inquiry."

Many of the newspapers have given wide publicity to Sir John Reith's replies to criticisms and, judging by their tone, the recent spate of antagonism will now die down again.

Evidence of Appreciation

The *Daily Telegraph*, commenting on the result of the M.P.'s inquiry, says: "Whatever is said in disparagement of the programmes they are the best available on any transmission in the world, and the rapidity with which the number of licences increases affords striking evidence of appreciation."

This newspaper pertinently asks: "What kind of control could be substituted for that of the present management?" That is a question on which the critics are strangely, though perhaps significantly, silent.

Criticism of the broadcasting machine is not in itself a menace to broadcasting, but rather a healthy sign of interest.



[Daily Express photo]

At night, two ex-Metropolitan policemen and an Airedale dog have recently been guarding Sir John Reith's home, Sir John is the proud father of two small children—a boy and a girl



Trying out the simple crystal set described in this article. At Letchworth it picked up four broadcasting stations!

Components Needed for the Four-station Crystal Set

- BASEBOARD**
1—7 in. by 3½ in.
- COIL**
1—Lucerne aerial type, as described in "Amateur Wireless" dated January 27.
- CONDENSER, VARIABLE**
1—Graham Farish .0005-microfarad, solid dielectric type.
- CRYSTAL**
1—Jewel Pen, Red Diamond, permanent type.
- SUNDRIES**
2—1½ in. metal mounting brackets.
1—Crocodile clip.
4-in. length of thin flex.
Connecting wire and sleeving.
2—Telsen terminal blocks.
1—Pair Lissen phones, type LN173.

FOUR stations on a crystal set? Yes, that is what we were able to tune-in during our test of the set—shown by the illustrations.

The locality was Letchworth, some forty miles north of London. At that point, with a full 100-ft. aerial and a sound earth, the two Londons came in at fine phone strength, with Midland Regional and Daventry National at slightly lower volume—but still worth hearing.

Powerful broadcasting stations really make a crystal set more worth-while now than in the old days when this type of set was so widely used. This we have been reminded of by our test.

As you can see, the set is ultra-simple to make. The chief component is, of course, the tuning coil. This is one of the famous Lucerne coils designed by "The Experimenters" to suit modern conditions.

Tuning Ranges

With a crystal it tunes from 195 to 600 metres on the medium waves and from about 900 to 2,000 metres on the long waves. These wide wavelength ranges are particularly useful in a crystal set, as in certain localities there are lots of transmissions other than those of the B.B.C.

The coil, as you may know, can be bought already wound from several firms, or, if you really want to learn something about coil design, you can make it for yourself from one of the kits of parts advertised in this issue.

There are two windings, the medium-wave winding being on the large outside former and the long-wave winding on the smaller

A Four-station Crystal Set

Build It for 17/6 (with Phones)

centrically mounted former inside. To tune in the medium-wave stations the inside winding is what we call short-circuited, which means that a length of flex is connected across the two ends so that it is out of action.

When the long waves are wanted, this inner winding is brought into circuit with the outer winding, the two together giving one continuous winding that covers the long-wave band with the specified tuning condenser.

You might compare the little theoretical diagram with the practical layout. It will help you to realise what the symbols mean. The coil is obvious on the left-hand side, with its various tapping points. The condenser for tuning this coil is marked ".0005" microfarad. The black arrow-head with the thin line against it indicates the crystal, and the phones symbol on the right is self-evident.

You will see that the .0005-microfarad tuning condenser is connected to the two ends of the tuning coil. The aerial lead on the extreme left of the diagram goes to the point A on the coil. This is 10 or 15 turns from the point S of the coil. In effect, on the medium waves only 10 or 15 turns are actually in the aerial circuit.

From S to E indicates the inner part of the coil and, when this is shorted, the medium waves are tuned-in. Of course, when the shorting wire is removed, all the winding is in circuit and then the aerial part of the winding is larger, being from A to E.

Sharper Tuning and Louder Signals

Another point to note is that the crystal is not taken to the TC end of the coil, but to the tapping point G. This materially reduces the damping of the crystal on the tuning circuit—makes tuning sharper and signals louder.

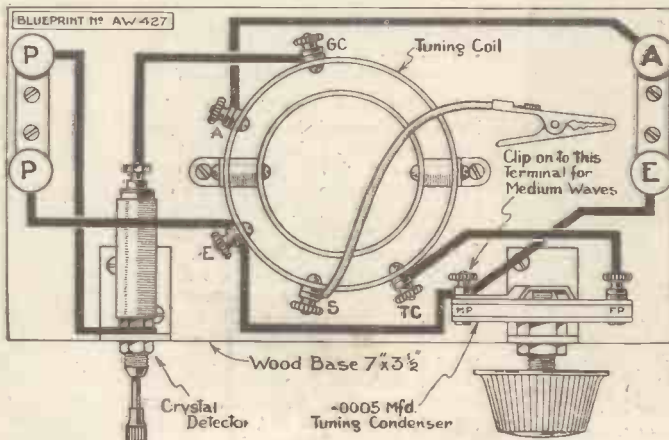
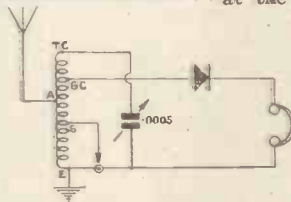
You can experiment with the aerial-tapping arrangement. About 15 turns from A to S will usually be just right, but a long way from a broadcasting station perhaps this might be increased to 20 turns with advantage.



This view shows the arrangement of the parts quite clearly



(Above) Another view of the Four-station Crystal Set, which can be made at home very easily; the coil can be home-wound or bought complete if desired. (Right) Theoretical circuit of the set; compare this with the wiring guide



Half-scale layout and wiring guide for the Four-station Crystal Set. A full-size blueprint can be obtained for 6d., post paid; ask for No. AW427. A copy will be sent by return of post

The practical layout of this circuit is clearly shown by the diagram. The coil is mounted at the centre of the small baseboard, being fixed with two screws in the little brass feet on opposite sides of the coil former. The tuning condenser is mounted on a small bracket near the aerial and earth terminal strip. The crystal, which is of the semi-permanent variety, is similarly mounted at the other end near the phones terminal strip.

A short flexible wire is fitted to the S terminal of the coil, and to its other end is fitted a crocodile clip. When you want medium waves clip this on to the E terminal, and for long waves you can clip it to the insulated sleeving going from the TC terminal to the condenser—or to a little terminal mounted nearby—anywhere so that it does not make contact with any of the set's connections.

Wiring up the Set

Then wire up according to the diagram, making special care about the coil connections. Use a full 100-ft. aerial with this set and a good earth. Rotate the tuning knob until you hear the local and then try re-adjusting the crystal plunger until you get the loudest possible signals. If you are far from the nearest station try connecting the aerial to GC on the coil.

A One-valver for America

Designed by the "A.W." Technical Staff

AMERICA on one valve! Rather wonderful, isn't it? Yes, and quite easy for any schoolboy to do with this little set. It is a one-valver for short waves. Very cheap to make and very snappy in action.

Practically the whole job is home made. The coil, for example, is wound on a ribbed ebonite former. It consists of sixteen turns, one half being used as the tuning coil and the other half as a reaction coil.

You tap the winding more or less in the middle and take this point to earth. The ends of the coil are left free, and you simply tap along each half to get the correct amount of coil inductance for both tuning and reaction.

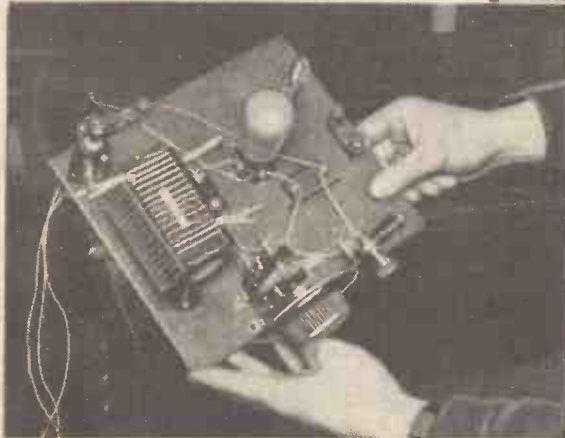
20-metre Reception

For example, if you want to tune in the 20-metre band you put your little crocodile clip about two turns from the centre, with the clip for reaction about two turns from the centre on the other side of the winding.

If you want to go up to the other end of the waveband, say to 50 metres, you move your tuning-coil clip up until you bring it about 7 or 8 turns. At the same time reaction turns are increased until

winding by a little dab of sealing wax. You must be careful, though, or the wax will not hold to the glass very well.

Measure off your 2½-in. length for the winding on the glass tube, and at the two limits of where the winding will fall rub over the



2.—The assembly and wiring of the set completed. Note the crocodile clips for tapping the coil in order to vary the wavelength range



3.—Making a final check of the wiring with the aid of a full-size blueprint. A half-scale reproduction appears on the next page

you obtain sufficient reaction over the entire tuning range.

This coil is, of course, the main component in the set, but there is another important component that you can make for yourself—the high-frequency choke.

On a ½-in. diameter test tube, which you can buy for 2d. complete with cork from any chemist's, wind on a little 36-gauge double-silk-covered wire. It is rather a job counting the turns of such thin wire, so just wind on enough to cover a length of 2½ in.

You can fix the two ends of the

glass with a nail file, just enough to roughen it.

The dab of sealing wax will then hold. Start off with a dab at one end, carry on with the winding, and then put on another dab at the end of the winding to complete the job.

The cork is for fixing the choke to the baseboard. You can either gum the cork to the baseboard or do as we did—put a screw through the base-



4.—Ah, here we are! The set finally completed and all ready for long-distance reception. It must be used with phones, of course, and will not drive a loud-speaker



1.—Starting construction of the one-valver to pick up America. Both the coil and the high-frequency choke can be made at home

board from underneath and screw the cork on to the projecting thread. Then, to fix your choke to the baseboard, simply jam the tube over the cork.

With the combined tuning and reaction coil and high-frequency choke you have the nucleus of a very snappy one-valver. To complete the set all you need are the few components given in our list.

Laying Out the Components

You can see how to lay out these parts from the illustrations. The tuning coil arrangement is quite clearly shown. On the ribbed ebonite former you wind your sixteen turns of No. 20 gauge bare tinned-copper wire,

PARTS NEEDED FOR THE ONE-VALVE SHORT-WAVER

BASEBOARD

1—10 in. by 9 in.

CONDENSERS, FIXED

1—.0001-microfarad.

1—.0002-microfarad.

CONDENSERS, VARIABLE

1—.0002-microfarad air dielectric, with 4-in. dial.

1—.0005-microfarad, solid dielectric.

1—J.B. .00002-microfarad neutralising.

HOLDER, VALVE

1—Four-pin.

PLUGS, TERMINALS, ETC.

2—welder plugs, marked: H.T.+, H.T.—.

2—spade terminals, marked: L.T.+, L.T.—.

2—terminal blocks.

RESISTANCE, FIXED

1—3-megohm, wire end type.

SUNDRIES

1—ebonite former, 3 in. dia. by 4 in. long, six ribs.

2—Bulgin coil supports, type TS1.

20-gauge round turned copper wire for connecting, and coil.

Oiled-cotton sleeving.

1—1½-in. metal bracket.

2—crocodile clips.

2 yards thin flex.

12 yards No. 36 gauge D.S.C. wire.

1—test tube, ½ in. dia.

VALVES

Cossor 210Det (or Mullard PM2DX, Marconi L2).

spacing the turns so that the whole winding covers the whole of the former, leaving about ¼ in. at each end.

When you have laid out the parts on the baseboard you can wire them up according to the layout diagram accompanying this article. We used 20-gauge tinned-copper wire covered with insulating sleeving.

Assuming that you have wired up the set, you will want to know a little about its operation. First, about the valve. Any good low-

Designing Your Aerial Circuit for Quality

By NOEL BONA VIA-HUNT, M.A.



It is important that only the best gang condensers should be used for tuning a receiver. Here is a final inspection being made in a factory

General Electric photo

AMATEUR: I have learnt quite a lot since meeting you, Professor, and yet I feel there is such a lot more to learn. We settled last time what were the essential features of real quality in musical sounds, and you also demonstrated to me a set designed by you which simply ravished my musical soul.

If only I could re-construct my own set on these lines, I should realise one of the ambitions of my life.

PROFESSOR: There is no reason why you shouldn't. In fact, I intend to show you the way. But we must go slowly, as I want to coach you up in the subject of quality design,

let us take sensitivity first. There are good, bad and indifferent aerials, as we all know. And you can have a good aerial in a bad place, and a bad aerial in a good place. I speak at present of the actual aerial, and not of the earth system or of the tuned circuit.

AMATEUR: I suppose most people would agree that the ideal is a good aerial in a good place.

PROFESSOR: You would imagine so. But there is not the agreement on this point that you would suppose. Quite a number of amateurs view the good aerial with suspicion.

AMATEUR: Why on earth—or rather, in the air!—should they?

PROFESSOR: Because, apparently, they feel that a good aerial will offer the hand of welcome to more than one wavelength over a fairly wide tuning scale. In other words, the idea is that a good aerial must be less selective than a bad one.

AMATEUR: A poor aerial certainly brings in fewer stations, and it can't be expected to pass the signals at the same strength as a good one.

PROFESSOR: Obviously not. But it is frequently supposed that a poor aerial enables the operator of a set to tune in the wanted signal more sharply. It has been proved by M. G. Scroggie, an eminent expert, who has given much time to the study of this and kindred matters, that a small aerial does not improve the selectivity of a receiver, and I have found this to be so in practice. Besides which, we have to use a little common sense in this matter.

What we have to consider is not how selective we can make a circuit, or how sensitive; but the ratio of sensitivity to selectivity. As a matter of fact, I prefer the word receptivity to sensitivity when discussing the properties of aerial systems, so let us adopt it in future.

Now Scroggie shows that a large aerial with no big losses has a higher ratio of selectivity to receptivity than a smaller one. So

that when people go into their back gardens and proceed to shorten their aerials in order to improve the selectivity of their sets, they are wasting their time. It would be far better to leave the aerial alone and pay more attention to the set itself.

AMATEUR: A good outdoor aerial is the ideal, then. And I well remember reading in a daily paper a remark to the effect that outdoor aerials were obsolete and useless adjuncts to a modern wireless set.

Important Link in the Chain

PROFESSOR: With the scrapping of the outdoor aerial would go an important link in the chain of real-quality reproduction.

AMATEUR: I don't quite see that. Surely the aerial cannot affect the quality of the received signals?

PROFESSOR: That is where you make a mistake. It does affect quality. The more efficient the aerial the less is it necessary to employ heroic measures to amplify the high-frequency waves in the receiver itself.

AMATEUR: What is the objection to high-frequency amplification?

PROFESSOR: The point we have to notice is that the aerial itself picks up the carrier wave of the transmitting station which we tune in on our receiving set. The carrier wave is, as you know, a high-frequency component, but it also embraces the low-frequency waves generated from the studio.

These low-frequency waves are presented to us in a very fair condition considering the

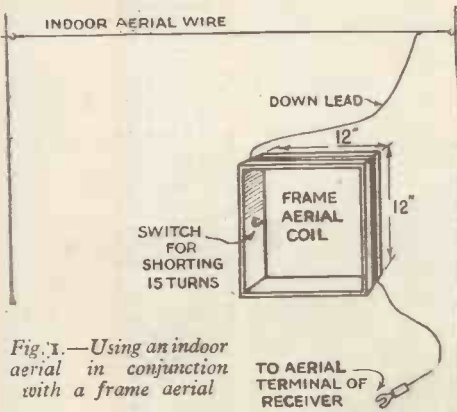


Fig. 1.—Using an indoor aerial in conjunction with a frame aerial

so that you may understand as well as appreciate the good things you are going to get from me. I don't believe in people just copying circuits or diagrams like so many parrots.

Wireless science is well worth studying, and I am hoping you may be able to lend a helping hand to others who are in search of that rare possession, quality.

AMATEUR: I am quite ready to listen to all you say, and you need not think I shall be bored.

PROFESSOR: Good. Well, we must start at the beginning of our receiver, and work our way through each stage till we arrive finally at the loud-speaker. The beginning of the receiver is, of course, the aerial circuit.

Effect of Aerial on Quality

AMATEUR: I have always understood that quality of tone is unaffected by the aerial and its associated circuit.

PROFESSOR: What do you mean?

AMATEUR: Well, it is only a question of sensitivity and selectivity.

PROFESSOR: Explain those two terms.

AMATEUR: By sensitivity I mean the capacity of the aerial to collect and pass on to the first valve the signals transmitted by the broadcasting station. By selectivity I mean the capacity of the aerial and its tuned circuit to select any particular transmission that happens to be wanted by the listener and to keep all others out.

PROFESSOR: Quite a clear description. Now

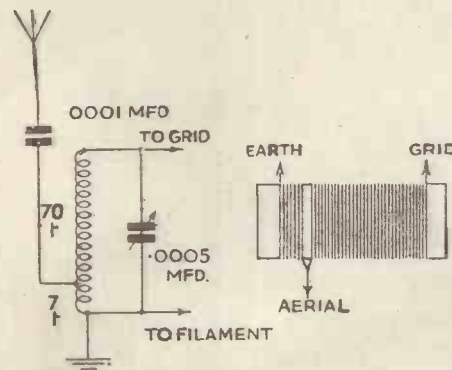


Fig. 2.—Taking aerial to a tapping on the tuning coil

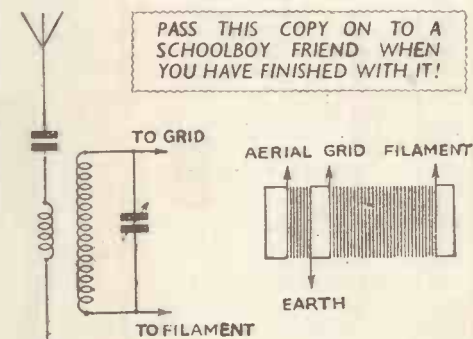


Fig. 3.—Arrangement of typical aerial "transformer," with a primary and secondary

experiences they have passed through from the microphone in the studio to our aerial wire. The varying amplitudes reach us almost unimpaired up to this point. The danger starts when we attempt to amplify these wave-forms by means of the thermionic valve and its associated circuits.

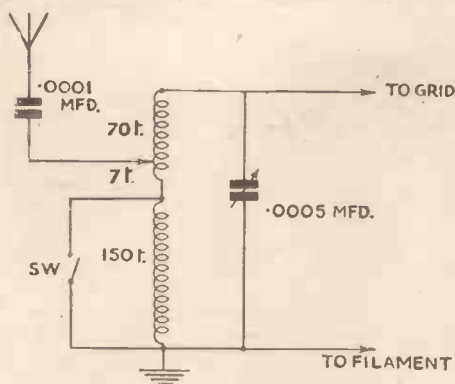


Fig. 4.—Additional winding for long-wave reception

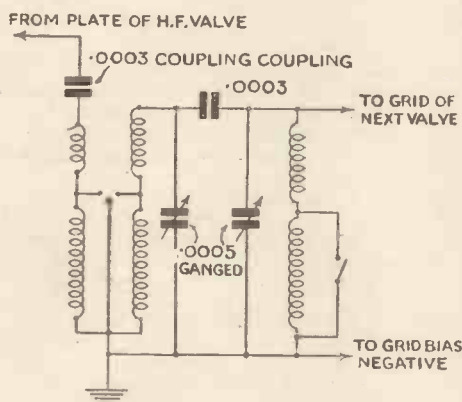


Fig. 5.—Band-pass circuit with top-capacity coupling

It is very necessary to preserve their original shapes and amplitudes intact by giving them a uniform enlargement, as when we enlarge a photograph. Incidentally, I may remind you that even when we attempt the enlargement of a photograph, we usually reveal the imperfections of the original film which perhaps were not so noticeable in the smaller picture.

So you see that amplification is a dangerous process and is apt to throw into relief the imperfections of the original if such exist.

AMATEUR: In that case, the more we can get from the aerial the better.

PROFESSOR: That is certainly a sound axiom.

AMATEUR: But supposing it is not possible to fix up an outdoor aerial?

PROFESSOR: Then we are compelled to resort to the next best.

AMATEUR: What is that?

PROFESSOR: An indoor aerial and frame aerial combined.

AMATEUR: How?

Boosting Signals

PROFESSOR: The indoor aerial should be strung up fairly near the ceiling and kept at least a foot away from the surrounding walls of the room. The down lead can then be joined to a frame aerial, the other end of which is connected to a tapping on the tuned aerial coil. Here is a sketch of the arrangement. (See Fig. 1.)

AMATEUR: What wire do you suggest for the horizontal portion of the aerial?

PROFESSOR: No. 28 to 30 gauge enamelled wire will serve the purpose. It would be practically invisible. The frame should be 12 in. square, and wound with five turns of No. 22 gauge enamelled wire for the medium waveband, and a further fifteen turns of the same wire for the long waveband. These extra fifteen turns must, of course, be short-

circuited when the medium waveband is received.

The frame aerial can conveniently be hung on the wall like a picture, provided the lead from the frame to the tuned coil in the set is not more than five feet in length. It would perhaps be possible to place the frame inside the loud-speaker cabinet in cases where the latter is a separate component from the set and placed quite close to it.

AMATEUR: Well, let us assume that the aerial is a good one, and if possible an outdoor one; what is the best method of coupling it to the first valve?

PROFESSOR: Don't forget that a good earth is also very important.

AMATEUR: Assuredly. We will assume that as well.

PROFESSOR: Very good. Then we have to consider what is the best form of coupling to either the high-frequency valve or the detector, as the case may be. The simplest coupling is, of course, a tuned coil; the aerial being connected to the top end, and the earth wire to the bottom end; the whole coil being shunted by a variable tuning condenser of the standard capacity, namely, .0005 microfarad.

But the merest tyro knows this won't do. A powerful signal would spread itself practically all round the tuning dial, and there would be no selectivity at all. There is hardly time to discuss the various methods of reducing this "flatness" in the tuning, so I must content myself with giving you the method I have found to work best in the interests of real quality.

Selectivity up to a point we *must* have. But we must see to it that we do not sacrifice quality on the altar of selectivity. One thing I have found essential, and that is to take the aerial input to a tapping of the tuned coil, either directly or through a small series condenser. (See Fig. 2.) No detriment to quality occurs even when the tapping is placed low down the coil, near the earthed end, as shown.

What I object to is the aerial transformer, that is, a double coil with primary and secondary turns. Here is such an arrangement. (See Fig. 3.) It must, however, be understood that the low tapping in the second diagram is only applicable to coils designed for the low or medium waves, and that for the high waves an additional coil with the correct number of turns of wire must be inserted between the bottom end of the low-wave coil and the earth connection, like this. (See Fig. 4.)

The long-wave coil winding is then short-circuited when it is

required to tune in to the medium waves.

AMATEUR: Supposing this arrangement is not selective enough for people living in such localities as Brighton, Tonbridge, or Dorchester; then what do you suggest?

PROFESSOR: We shall be compelled to introduce a band-pass unit after the high-frequency valve. (See Fig. 5.) But I must make it quite clear that iron-core coils are not safe for quality. The curves reveal a nasty cut-off above 4,500 cycles in most band-pass tuning circuits where these coils are employed. The selectivity is excellent, but not the sensitivity, nor the frequency-response curve.

Ganged Tuning Coils.

AMATEUR: What coils do you recommend?

PROFESSOR: Excellent coils are made by Varley, called Square Peak canned coils, and this firm makes a three-gang band-pass unit with wave-change switch, called the BP13, which serves our purpose admirably. These are air-core coils, and the mixed coupling gives a constant peak separation of 10 kilocycles.

AMATEUR: What coupling do you prefer for band-pass coils?

PROFESSOR: I do not think there is much to choose between inductive and capacity coupling. Personally, I prefer top capacity coupling. (See Fig. 5.) The BP13 unit has, I believe, a .02-microfarad condenser mounted in the secondary coil, but this is a small point, and a .0003-microfarad condenser can easily be substituted for top-capacity coupling.

AMATEUR: Supposing that even with the band-pass unit the tuning is not sharp enough to cut out interfering stations?

PROFESSOR: The only course left is to provide two stages of high-frequency amplification. Alternatively, a super-het circuit can be resorted to. I must confess that I prefer the former. Better still is a single stage of high-



Three-coil unit of Varley Square Peak canned coils; the mixed coupling gives a 10-kilocycle separation

frequency amplification.

AMATEUR: You mean for quality?

PROFESSOR: Yes. Stations that interfere with the local arc bitter enemies of the quality seeker. Some people are very lucky in the district they inhabit, others are much to be pitied.

AMATEUR: What about ganging the tuning condensers?

PROFESSOR: There is little objection to a two-gang condenser for the band-pass filter, but a three-gang condenser to include the simultaneous tuning of the aerial and band-pass coils introduces difficulties to the quality seeker.

However, we must not spend any further time on this subject to-night. The question of designing the high-frequency amplifier can wait till next time.

[Those who missed the first two articles of this quality series should note that the first appeared on page 290 of "A.W." for March 17 and the second on page 309 of "A.W." for March 24. Copies are available for 4d. each, post paid.—ED.]



[H.M.V. photo]

"On a steamer coming over"—the ship's cook is entertained by a portable receiver

On Your Wavelength

By Thermion

Most Important Valve Idea?

A CORRESPONDENT who is obviously gifted with an inquiring turn of mind, puts a bit of a poser. He asks, quite bluntly, what is the most important valve development since de Forest first put in the grid.

From one point of view, the palm might go to the inventor of the second or screening grid, because it gave us "easy" high-frequency amplification and also pointed the way to the pentode. But the first variable-mu valve was a good effort, too, because it unlocked the door to modern S.A.V.C.

However, if one goes back a bit farther, there is the high-vacuum valve to consider, and also the dull-emitter filament, which in a sense was the forerunner of the indirectly-heated valve and the all-mains set. On the whole, I think I'd better give it up!

Pentagrid Converter

ONE is on equally difficult ground when it comes to the more recent arrivals; though here, perhaps, I should "plump" for the pentagrid converter, which uses the principle of electron coupling.

Just at present this valve is going strong in most of the new superhets, and I fancy it will find still other applications in the near future. Incidentally, rather startling developments seem to be on the way in high-frequency amplification, which is rapidly being brought to the point where the set will be all high-frequency, plus a dry-contact rectifier and a loud-speaker. If so, we shall be able to say good-bye to high-priced low-frequency transformers, chokes, and all that. I wonder!

Ill-timed Experiments

SOME listeners seem to find a positive pleasure in fiddling about with the grid-bias battery, trying the effect of a few more volts on this valve and that. This is all wrong. Once the correct setting has been made, the bias should be allowed to stay put—unless the high-tension battery is on its last legs, when one can sometimes push up the volume by moving the grid plug down a point or two.

But, generally speaking, it is not good practice to shift these plugs about when the set is in operation. In fact, with a pentode output, an ill-timed experiment of this sort is very likely to cost the price of a new valve.

Long-Wave Reshuffle

THE proposed new scheme for the long waves is very interesting, for it shows several fresh developments. First of all, the long waveband is now made to extend up to 1,948 metres, though under the Lucerne Plan 1,875 metres was the highest wavelength assigned. This extreme wavelength is given to Kaunas, whilst Huizen can now hardly grumble, since it is given an even

longer wave than the 1,875 metres for which it has such an affection, having been placed on 1,886 metres.

Next, as I predicted, the existence of Luxembourg has been recognised, and this station will keep its very favourable wavelength of 1,304 metres. Lahti also does well, being placed on 1,807 metres instead of the 1,145 metres assigned to it under the Lucerne Plan.

No provision is made for the Eiffel Tower, since it is understood that the French Government has definitely agreed to make this a medium-wave station.

Scrambling for Wavelengths

IF the scheme is adopted, the fun will come when Motala, Warsaw, Kharkov, and Minsk scramble for wavelengths. These stations have shown themselves so unwilling to agree to anything assigned to them that the U.I.R. simply left four wavelengths free and is saying:—

"Here you are. There are four wavelengths and there are four of you. Fight it out among yourselves!" These wavelengths range from 1,796 metres down to 1,345 metres, and everybody is sure to want the longest of them. I shouldn't be a bit surprised if we found all four stations trying to transmit at once on it one of these fine days.

The scheme is a thoroughly good one, so far as I can see, and I hope most devoutly that it will be agreed to all round.

My Battery News

THE triple-capacity battery undergoing the 10-milliampere test at four hours a day still shows no falling off in voltage for the last fifty-six days. It still begins each day's run at 108 volts under load and reads 103.8 volts four hours later.

Of the "five-bobbers," which are undergoing an eleven-weeks' test under a 7-milliampere load for six hours a day, one is doing very much better than the other. Here are the figures at the end of the second week—actually these are the readings at the end of thirteen instead of fourteen days, since this issue of AMATEUR WIRELESS goes to press one day

earlier than usual owing to the approach of the holidays.

Battery A.—Starting voltage under load: 96.0. Finishing voltage under load: 87.6.

Battery B.—Starting voltage under load: 104.0. Finishing voltage under load: 91.6.

What Are the Tests For?

ONE reader asks what I am endeavouring to prove by means of these tests with the five-shilling batteries. Let me say, first of all, that I have no axe of any sort or kind to grind and that what I do want to do is to show readers how to obtain the very best value for their money. I am confident that many of the claims made by correspondents for cheap batteries will not hold water. I don't mean that they are handling the truth carelessly or anything of that sort.

It is simply that they often err on the generous side in estimating both the current drain and the hours of service. My endeavour is to show what cheap batteries will do and what they won't. If they turn out on test to have good performances, nobody is more pleased about it than your Thermion.

Jury of Broadcast Listeners

A NOVEL idea which I pass on to the B.B.C. for their august consideration has been evolved by WLW, the Cincinnati station. At fairly frequent intervals an hour is devoted to a mock murder trial, which is exceedingly well done. After the judge has summed up, he announces that the jury will now consider its verdict. The jury are the listeners, who are invited to send their finding on postcards. A day or two later the verdict is announced.

This kind of thing can, of course, be easily overdone, but it strikes me that if an occasional trial of this sort were staged at Broadcasting House, it might be a very popular feature. It goes without saying that both the "book" and the actors would have to be absolutely first-class.

How to Cure Interference

IF you want to know all about the different kinds of man-made interference and the ways in which most of them can be alleviated, if not cured altogether, you should get hold of a copy of the little booklet: "Disturbance Suppression," which is published by Messrs. Belling & Lee.

I have just finished reading through my copy, and it strikes me as an excellent piece of work. One very good point is that no exaggerated claims are made for the suppressor devices made by the firm. They say quite frankly that certain cases are beyond them.

It is surprising how few people know, though, that by spending a few shillings on the installation of a simple suppressing device it is often possible to get rid of noises spoiling reception.



[H.M.V. photo

Shall we be able to do this at Easter? A scene in the garden with a modern portable receiver fitted with S.A.V.C. and a moving coil loud-speaker

How Long is the Needle Track?

AN argument started the other night when three or four of us were discussing gramophone records. One fellow expressed surprise that an ordinary needle should be good for only one side of a single record; but I asked if he had any idea of the length of the track that it had to follow.

He confessed that he hadn't, so I asked the others to make guesses without doing any kind of calculating in their heads. These ranged from 100 feet to 100 yards.

Then we worked it out in this way. A 12-inch record revolves on the average seventy-eight times a minute and runs for four minutes.



Moulding bakelite cases for the pick-ups used on the Marconiophone model 286 radio gramophone

Hence there are 312 turns in the spiral made by the grooves. The diameter of the largest groove is about 11 inches and that of the smallest, 4 inches or so. If we take the average at 8 inches, or two-thirds of a foot, then the sum works out at approximately 653 feet 6 inches, or nearly one-eighth of a mile.

Now, just imagine the needle dragged at a speed of about two miles an hour over a furlong of wax, to whose surface it is applied with a pressure of a hefty number of pounds to the square inch, and you won't be surprised that you have to change them so frequently!

Exit Valve Pins?

THE Mullard people, as you no doubt see, are bringing out a complete range of valves of an entirely new type in which pins are done away with. I am very glad to see this, for I have always hated valve pins, which can be sources of a great deal of trouble.

In the new valves, side contacts on the cap are used which butt up against similar strips let into the inner rim of the holder. The metal pip on the top of the bulb has been adopted for every type of valve. It forms the control grid connection and contact with it is made by means of a spring clip.

This practice has obtained in America for some little time, but I cannot say that I am absolutely in love with it, for it is apt to make for rather long grid leads, and even on the low-frequency side short ones are to be preferred.

A Good Commentary

DID you manage to hear the running commentary on the Boat Race? I hope so, for it was very well done. I expect, though, that a great many people must have missed it, for the time was changed no less than three times. Originally it was 2.20 p.m.; then it was put forward to 1.45 p.m., and finally it was fixed for 2.10 p.m.

The start was actually a little late, so that would give people a chance who had not heard of the changes. Boat Race commentators have profited by experiences of past years. Mr. Snagge wisely did not try to describe every yard of the race, and he kept us all thrilled throughout that eventful eighteen minutes.

Wireless Licences and Families

FIGURES published recently by a leading trade paper showing the number of licences and the number of families in England, Scotland, Wales, and Northern Ireland make extraordinarily interesting reading. Very good figures are shown by the county of London, in which there are just over 900,000 licences to a little under 1,200,000 families. In other words, three London families out of four have wireless sets.

The record, though, is held, so far as I can see, by Hertfordshire, which has in round figures 85,000 licences for 103,000 families. Thus almost four out of five households in Hertfordshire have their wireless sets.

The smallest number of licences for any county is that for Sutherland, where there are 603 licences for 4,178 families—little better than one family in seven. This figure will, no doubt, improve when the North Scottish Regional station is constructed.

February Radio Licences

DURING the month of February the increase in the number of wireless licences amounted to 61,250, which is equivalent to 2,187 per day for the whole month, including both weekdays and Sundays.



ANOTHER PIRATE "BROADCASTER" GOES OFF THE AIR!

William Lee, a 20-year-old cclliery clerk of Brampton Bierlow, was fined £2 at Rotherham for "broadcasting" without a licence. Details were given in this feature last week and here you see the gear that was actually used for transmitting

Pretty remarkable, isn't it?

The grand total, including licences issued free to the blind, now amounts to 6,191,950. It is pretty astonishing, though, in just over a dozen years. At the beginning of 1922 there were only about 30,000 licence holders and probably not one in fifty of them had a valve set.

In 1933, one and a quarter million pounds' worth of valves was sold to the public in addition to those sold to manufacturers and supplied by them with finished sets.

Laying the Ghost in Goloshes

NO one, I expect, regrets the passing of those dull and sickening thuds that used to be the interval signals of the London stations. I forget who it was that called them the footsteps of a ghost in goloshes, but it always struck me that the description was very apt.

The new Bow Bells interval signal is excellent and it is just the very thing for London. For hundreds of years the test of good Cockneyhood has been whether or not one was born within the sound of Bow Bells.

Other Regional Noises

IT may not be so easy to find appropriate noises for the other Regional stations, but something will have to be done about it. Scotland might have the plaintive cry of the haggis calling to its young in spring-time, and for the North Regional what could be better than the clatter of clogs on paving stones?

The West is a bit difficult, but we might have the creaking of a cider press or a male voice choir (duly lubricated with the aforesaid cider) singing "Old Uncle Tom Cobbleigh and All."

For the moment, the Midland defeats me. Is there a typical Midland noise? Perhaps readers who live in those parts can offer some suggestions.

Waves and Brain-Waves

AN American professor announces the discovery that the process of thought can produce a galvanometer deflection. The harder the subject (or should one say patient?) thinks, the bigger the deflection. It was suggested many years ago that there are actually such things as brain-waves, by which I mean waves generated by the brain.

The professor's experiments seem to show that there is a good deal of truth in the idea. Probably you have tried for yourself the experiment of making a person look at you.

Pick out anybody at random in a crowd or theatre audience and make up your mind that he shall turn round and gaze upon you. As a rule, it doesn't take very much concentration to produce the desired result. The suggestion is that a definite train of waves is transmitted and that both telepathy and thought-reading are accomplished by those who are particularly good "receivers."

Wozzat?

DID you admire very greatly the performance of *Wozzeck* as presented for our edification the other night by the B.B.C.? I don't pretend to be musical, and when noises which reminded me chiefly of a free fight in a home for demented tom cats began to come through, I tuned in something else rather hastily.

Sets of the Season Tested

R. G. D. Model 702 Auto-radiogram

WE can only compare the reputation of R.G.D. in radio with that of Rolls-Royce in the motor-car industry; just as one expects a car with this name to be the finest obtainable so it is with R.G.D. radio receivers.

The cabinet is the first point that catches the eye. It is of solid walnut of the upright type with the more important controls fitted on the front, so that adjustments can be made with the gramophone running and with the lid closed. It is impossible to hear any pick-up chatter or sound of any kind from the gramophone when the lid is closed.

No Second-channel or Whistles

To prevent second-channel interference and heterodyne whistles in radio reproduction a pre first-detector high-frequency stage is used. This stage uses a variable- μ screen-grid valve, followed by a similar type of valve as the first detector. The local oscillator is a triode valve in a cathode-injection circuit.

There is one intermediate-frequency stage followed by a double-diode-triode valve as a second detector. As well as acting as a rectifier, this valve provides a very efficient form of self-adjusting volume control, while the triode portion boosts the signal voltage.

In a receiver of this price and type the quality is of vital importance. To make quite sure that there would be no trace of distortion or over-emphasis of the top notes, a large triode output valve is used. This valve feeds into two carefully balanced moving-coil loudspeakers, which handle the full output quite easily and at the same time give superb quality.

Volume without Overloading

On both radio and gramophone reproduction, the volume is sufficient to fill a small hall without any trace of overloading. The tone control, which is variable and works on both radio and gramophone, is smooth in operation and cuts out any stray whistles or needle scratch from the pick-up.

A simple visual tuner is embodied and is very essential on this set. The selectivity is of the order of 8 to 9 kilocycles and if really good quality is to be obtained the receiver must be tuned-in accurately. This is a very simple matter with a visual tuner as the tuning controls can be adjusted with the volume control turned down so that no sound is heard.

All the controls are on the front in a recessed panel with an illuminated calibrated tuning

dial, underneath which is the tuning indicator. The tuning range is from 200 to 560 metres and from 800 to 2,000 metres.

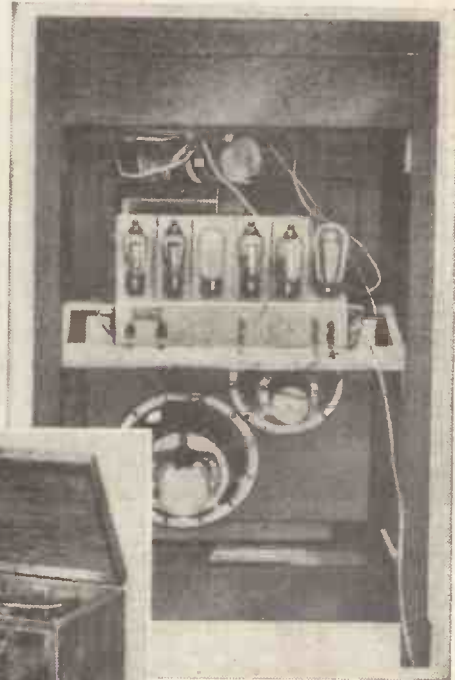
On a small indoor aerial we heard such stations as Aberdeen and Newcastle at good loud-speaker strength without fading. This absence of fading, of course, is due to the automatic volume control. Seventy-five to eighty stations were tuned-in on the medium waves without any use of the volume control at all.

A fine achievement was the reception of Bucharest free from interference by Midland Regional, while such stations as Prague, North Regional and Langenberg could be tuned-in at full loud-speaker strength without any trace of side-splash. One does not realise how important is automatic volume control until one compares this receiver with a standard set without any self-adjusting volume device.

Such stations as Fécamp and Athlone, which fade very badly, can be tuned-in and held for long periods without any noticeable variation in signal strength.

When radio programmes are inclined to be dull, the value of the automatic record-changer is soon realised. This changer will play eight 10- or 12-in. records without attention, making it possible to have a forty-minute record programme without moving from your armchair.

The whole receiver gives one the impression of having been very carefully thought out to



Note the neat arrangement of the chassis, and dual loudspeakers inside the cabinet of the R.G.D. model 702. Autoradiogram



The external appearance of the set is particularly pleasing; note the sloping control panel

include just what the fastidious user expects; to be good value for money and to be easily accessible in case of an unlikely breakdown. The mains transformer and fuses are easy to get at, so that voltage adjustment and fuse replacements are an easy matter.

Space has been left beneath the automatic record-changer for any little adjustments that might have to be made after prolonged use.

Pentagrid Pointers

EVERYONE seems to be a pentagrid fan now. The set designer must have one, the home constructor thinks he should have one, while the set buyer is firmly convinced that his new four-valve superhet will be useless without one. Granted the designer knows why he wants a pentagrid, but does the average amateur?

Ever since the first serious introduction of the superhet, there has always been trouble with the first detector-oscillator circuits. What with inefficient couplings, poor conversion factors and other seemingly inherent troubles, it was not at all certain for quite a long time that the superhet had come to stay.

Several manufacturers use combined detector oscillators and multi-electrode valves, but they still have to find the most efficient method of coupling the two circuits together.

For the past two or three months all the valve manufacturers have been concentrating on a valve that would not need any external coupling, so that the maximum efficiency over both wavebands would always be maintained. This valve has now arrived, and has been designated the pentagrid.

It is quite obvious how its name was ob-

tained, as the valve has five grids in addition to the usual anode, cathode and heater. The first interesting feature is that the pentagrid is a single-purpose valve only. It is intended for use as a frequency changer in a superhet and for no other purpose.

The function of a frequency changer is to mix the incoming signal from the aerial (or preceding high-frequency stage) with a locally-generated signal. The frequency of this oscillation is always that of the intermediates.

Special Coupling for Mixing

Now to mix the local oscillator circuit with the first-detector circuit needs an efficient method of coupling, irrespective of whether you use a separate detector and oscillator or whether you use one valve for both operations. This is where the snag comes in—trying to find the most efficient circuit. There are numerous circuits with good points, but all have snags of some kind.

With the introduction of a pentagrid this trouble is virtually at an end, as there is no actual external coupling. What coupling there is takes place within the bulb, so efficiency is maintained over both wavebands.

IN A NUTSHELL

Makers: Radio Gramophone Development Co., Ltd.

Model: 702 Autoradiogram.

Price: £70 7s.

Valve Combination: Six valves in a superhet sequence with valve rectifier. A variable- μ screen-grid high-frequency stage, followed by variable- μ screen-grid detector, triode oscillator, screen-grid intermediate-frequency stage, double-diode-triode second detector and automatic volume control valve, with triode power valve output.

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

Type: A.C. de luxe radio gramophone with automatic record changer.



For photo]

"GOOD heavens, what have you got there?" said a friend of mine as he came into my laboratory the other evening. "What is it, the remains of an old set or part of a new one?"

"That," I said with the kind of smirk one assumes when there is a chance of showing off a slight superiority, "that is a finished set, and, what's more, it works!"

And as I joined up a flexible wire to one terminal of the accumulator (the other being already connected) the loud-speaker nearby burst into song, or fat-stock prices, or weather reports, or whatever was going at the time.

The visitor gazed at the set for two or three minutes, and then nosed around it for more details. "Yes, it works," he said, "and I can see three valves and three valve holders, and here are a couple of fixed condensers, but where on earth have you put all the rest of the stuff?"

How and Why the Set was Designed

"Well," I replied, with affected boredom, "I suppose I've got to tell you all about it. Sit down there and listen. You will find a cigarette by your elbow.

"I built this set just because I wanted to show AMATEUR WIRELESS readers that if you understand the principles of wireless you can make a set very simply and very inexpensively, provided you do not tie yourself rigidly to certain accepted conventions.

"A tuning coil, for example, is so frequently wound in cylindrical form that we are inclined to think that is the only way of making one. Variable condensers are so conveniently made with air spacing and two sets of semi-circular, or practically semi-circular, plates which intermesh with one another, that one can easily run away with the impression that nothing else will do for tuning.

"Fixed condensers, which, after all, are nothing but sheets of metal interleaved with suitable insulating material, have become so standardised in their make-up of bakelite containers that here again the container is looked upon as the thing itself. And so I could go on.

Detector and Two Low-frequency Stages

"I wanted to make a loud-speaker set and I wanted to make it cheaply. I do not pretend this set has knife-edge selectivity, nor do I suggest to you that it gives all the maximum strength you can get with three valves, but the circuit is a sound one and consists of a detector with two low-frequency stages, reaction being provided and controlled by a variable condenser.

"Although you have not yet spotted the exact idea I will show you in a minute or two that the coil is accurately tuned with a variable condenser which has a maximum of about .0005 microfarad and a minimum much smaller than most variable condensers at present marketed!

"The reaction condenser, too, is smoothly variable, and the coil, which is wound in the shape of a flattish oval, is actually very efficient. After we get the signal from the detector it must be magnified, and here I could have used a transformer coupling with a pentode and got adequate loud-speaker results on the local station, but this would not have had the simplicity I wanted to get in this set. Furthermore, the pentode is a more expensive type of valve than I wanted to use.

The SCHOOL

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

to the former by being
The winding is then co
the further turns need
pushed through two ho
"Here we have the
is slipped into the set i
plywood, and the long
way. In this laborat
necessary measuring



Here is the set completely assembled and being used for reception. Operating hints will be given next week



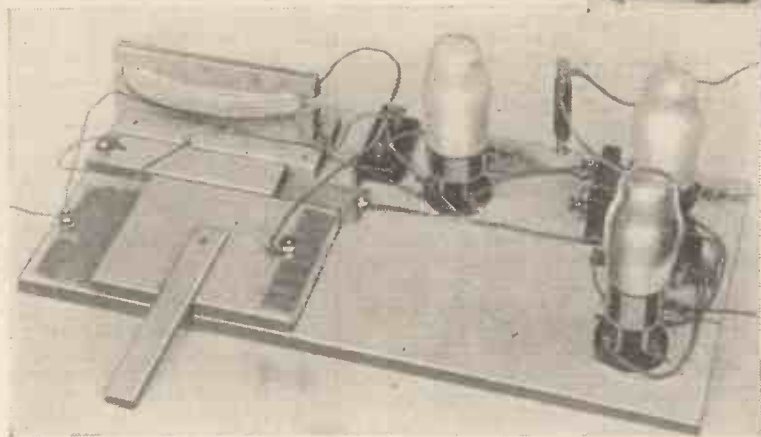
This plan view shows... and w

THIS SET HAS REACTION CONDENSER

"While transformer coupling is generally used nowadays resistance coupling has certain advantages, being cheaper and much simpler to make, although the same degree of magnification is not obtained. One ordinary inexpensive valve, resistance-coupled to the detector, would not have given enough strength, so I have added a second cheap valve, also resistance coupled, making a three-valve set in all, with adequate volume.

"In getting the maximum simplicity such things as wave-change switches, on-and-off switches, and the like have been omitted, for they have nothing whatever to do with the principles which it is desired to demonstrate in this set.

"Let us start with the coil. This is very simply wound on a piece of plywood shaped as in one of the drawings, and the end of the wire is secured by being passed through two holes drilled in the former as shown. After the larger winding has been wound on a long loop is taken out and twisted into a single lead, which is again anchored

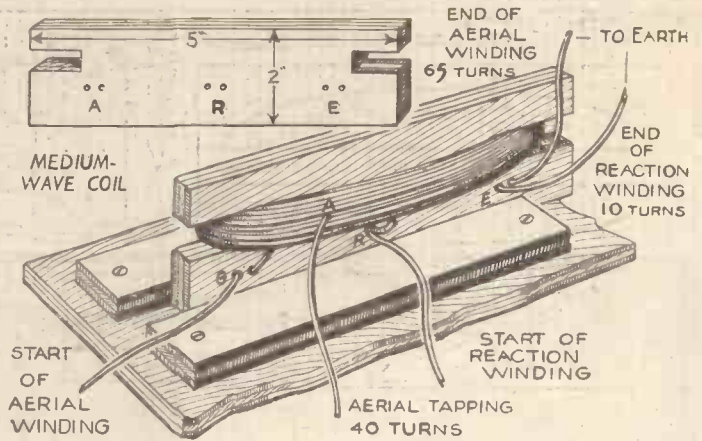


DOLBOY'S THREE

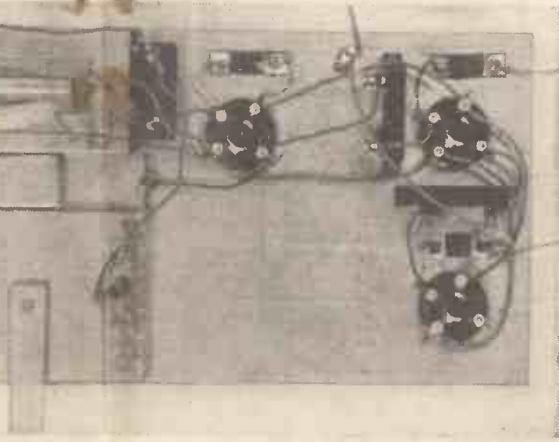
Set to Build in the Easter Holidays

...passed through the holes shown. continued in the same direction for necessary for reaction and the ends to secure it tightly. complete medium-wave coil, which in the groove made by two strips of wave winding is made in the same way there are, as you see, all the instruments for ascertaining the

"Why should I?" I responded. "It would be necessary to obtain the right size of tube first of all, whereas anyone can find a piece of wood round the house to the measurements I have given. Secondly, it is by no means easy for a beginner to wind a single-layer coil neatly, with the turns just touching, but not overlapping, and unless such a coil is made neatly it looks a very sloppy job. "What usually happens is that about two turns before the end, when you are priding yourself on having made

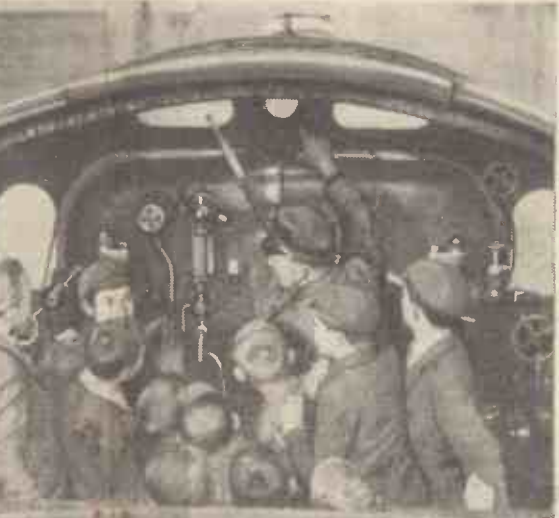


From top to bottom the drawings on the right show the construction of the medium-wave coil, the main tuning condenser, the reaction condenser, and the grid leaks. Details are also given in the article



could be consulted in conjunction with the half-scale layout wiring guide that will be found on the next page

A HOME-MADE COIL, HOME-MADE TUNING AND REACTION CONDENSERS AND HOME-MADE GRID LEAKS—A SET EVERY BOY WILL WANT TO MAKE!



Boys always like to know "how it works." And you will be able to learn a lot about radio by building this set, which is really very inexpensive for a three-valver

exact inductance, capacity, and so forth of the various parts, and the design of these various parts and the working out of the windings, etc., took considerable time, but once they were found it was a very simple matter to note them down. "Why didn't you wind the coil in the usual cylindrical way?" asked my friend.

maximum capacity. This is about .0005 microfarad, and is sufficient to cover the wavelength range with the coil. "Tuning is simply done by sliding the block backwards and forwards, and fine tuning by moving it at a slight angle—you will soon get the trick—like this!" And I showed him just what to do by pushing the block slightly with the tip of my finger. "A strip of wood has been screwed down so that the hand does not come too near the top block so as to avoid

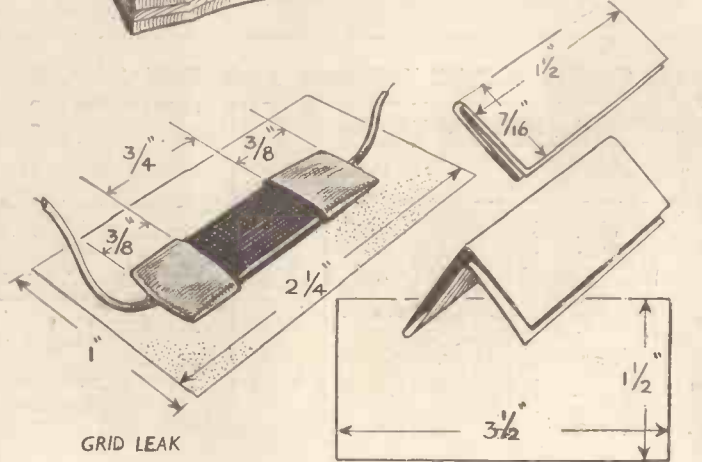
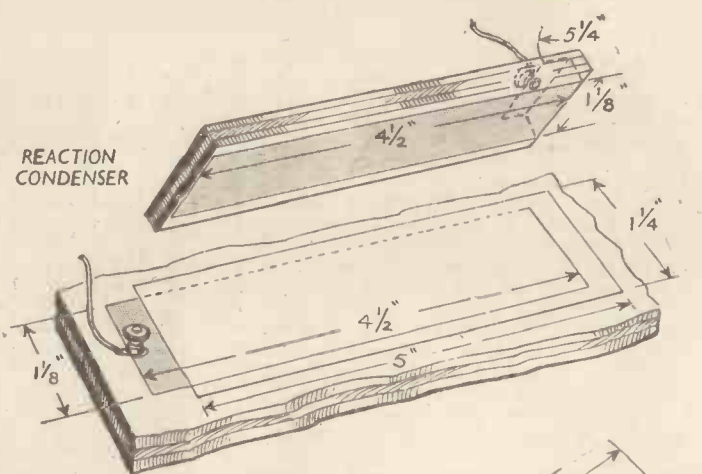
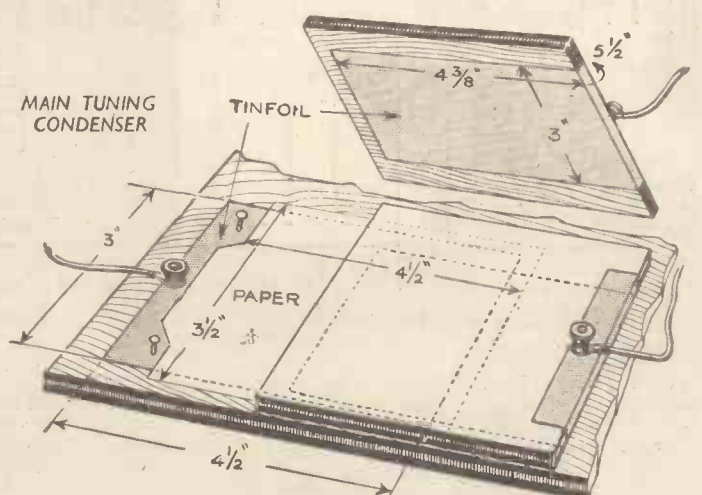
quite a professional coil, the whole darned thing springs out of your hand and nearly strangles the cat. The coil wound as shown is actually every bit as efficient as the most neatly made cylindrical coil, and is about as easy to make as winding a long piece of string on to a bit of wood!" "What is that square block of wood with a lead on it lying on the top of the baseboard?" came the next question.

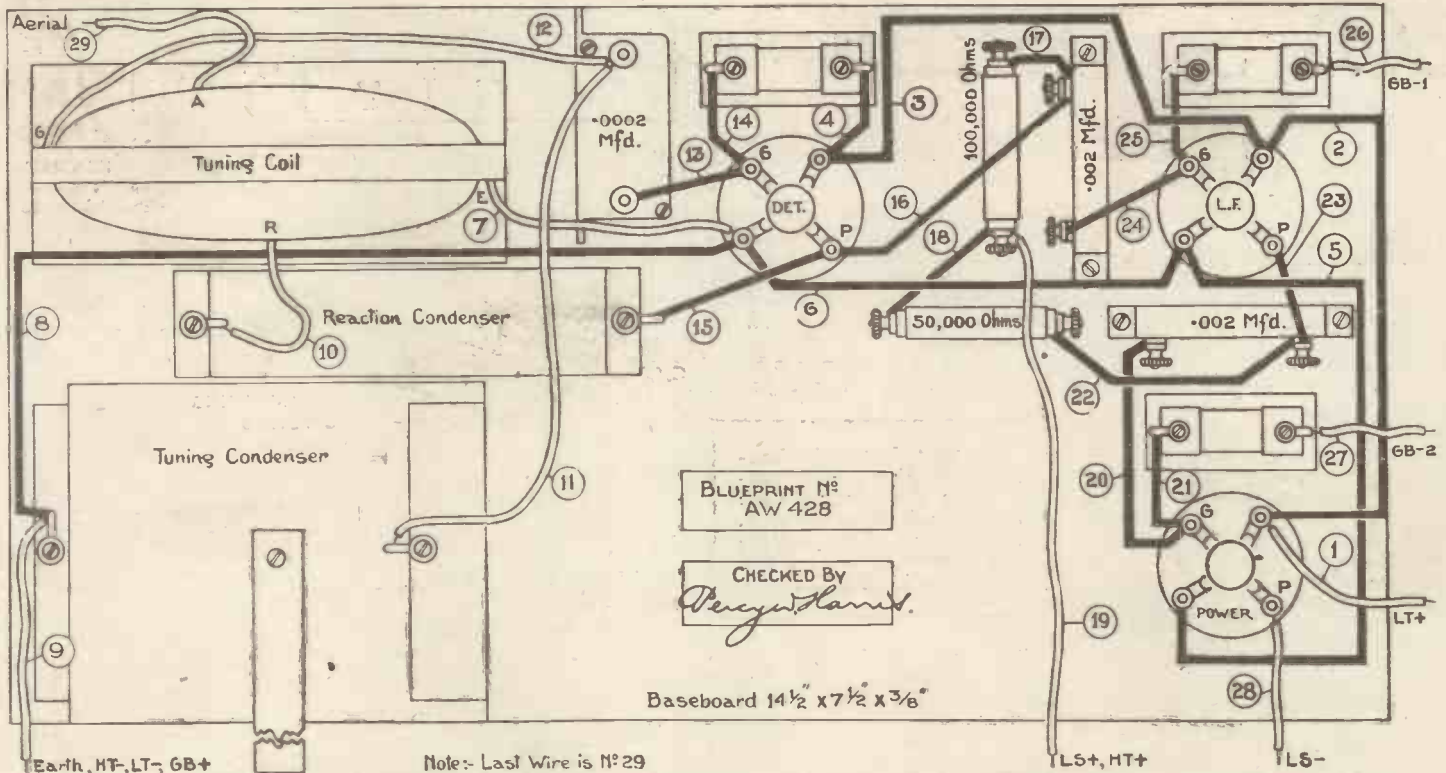
"That is the piece de resistance—the variable condenser. The baseboard, as you see, is simply a flat piece of plywood, and at one end there is a strip of silver paper stuck down with Secotone and taken from a packet of Players' cigarettes. On top of this I have stuck two strips of the wax paper off the same packet of cigarettes, this wax paper forming the dielectric, as we call it.

"On the underside of the block of wood another piece of tinfoil from the packet of cigarettes is glued and brought round over the top where it is folded once or twice and gripped between the wood and a washer held under the head of a brass screw. Between the head of the screw and the washer I have put a soldering lug and the firm contact of the washer with the foil makes sound electrical connection.

How to Tune the Set

"Now if the block of wood is slid away to one end so that the top foil is off the bottom tinfoil the capacity is at minimum, and as we slide the block of wood along to the left of the set the capacity gradually increases until, when it completely covers the under-foil, the top block gives a





Half-scale layout and wiring guide for the Schoolboy's Three. Connect up in the numerical order indicated by the numbers in circles. Full-size blueprints can be obtained for 1s. each, post paid; ask for No. A.W. 428 when ordering.

hand-capacity effect, but this is not strictly necessary.

"I have drawn out the connections so that you will see how to build it up if you want to," I said.

"The grid leaks, of which there are three, are made by taking a sheet of paper from an old copy of AMATEUR WIRELESS, cutting it into strips of the size I am giving and dipping these strips into Indian ink. Indian ink is a very slight conductor and if the strips are folded in the manner shown, tinfoil wrapped round the ends, with the spacing given, they will have about the right value.

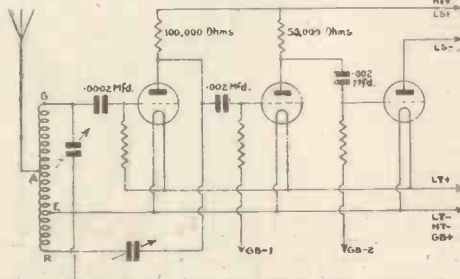
"Although it is not strictly necessary in dry conditions it is a good plan to paint the baseboard over with a coating of hot paraffin wax before you start to assemble the set, making sure the wood is quite dry before you do this.

"Electrical connection with the grid leaks is made by passing wood screws through the tinfoil at each end so as to secure the leaks to the baseboard. Under the head of each round-headed brass screw should be placed a soldering lug for you cannot solder to the tin foil. As a precautionary measure it is well to drill a small hole first before you insert the screw and pour a little hot paraffin wax into it. Then when you

put the screw in the hole a further insulating layer is provided in the wood.

"I could show you how to make the fixed condensers of .002-microfarad capacity which are used for coupling but for certain electrical reasons it is desirable that these should have mica dielectric and as they only cost sixpence or so each it is better to buy them ready made.

"The reaction condenser, by the way, is made in a similar way to the tuning condenser and that doesn't want any further explanation. Let us see if we can get a few more stations."



Operation hints will be given next week

Television from the Crystal Palace

TEN miles away from Wardour Street, where a company meeting was held, its chairman addressed the shareholders—and they all heard and saw him do it.

By the magic of television, of course. Sir Harry Greer was at the Crystal Palace. The meeting was of the Baird Television, Ltd.

Its chairman chose this novel method of opening the proceeding to give living proof of the company's progress in television—particularly in ultra-short-wave high-definition television.

Absent Sir Harry

When the directors took their seats at the meeting, the shareholders noticed that Sir Harry Greer, the chairman, was not with them.

To the astonishment of the audience, the private cinema in which they were seated was then darkened, and the clearly recognisable image of Sir Harry Greer appeared on a television screen about one foot square.

While his twenty-minute speech was in progress, the shareholders were able to judge the effectiveness of this latest Baird development. The movements of his face were clearly visible, flickering being very much less than with the old thirty-line television images.

B.B.C. and Television

While the ensuing television programme was on, Sir Harry Greer motored quickly back from the Crystal Palace.

He made some very interesting comments on the position of the B.B.C. in relation to television broadcasting.

He stated that the Baird television system had now reached such a stage of development that a regular service on ultra-short waves could be offered to listeners living anywhere in Greater London. The trouble was that at present the Baird company worked on an experimental licence, and had no authority to send out regular programmes to listeners and lookers in this country.

COMPONENTS NEEDED FOR THE SCHOOLBOY'S THREE

SUITABLE VALVES			
Make.	Detector.	Low-frequency	Power.
Cossor ...	210HL	210HL	215P
Dario ...	TB232	TB232	TB062
Hivac ...	H210	H210	P220
Lissen ...	HL2	HL2	P220
Marconi ...	HL2	HL2	EP2
Mazda ...	HL2	HL2	P220
Mullard ...	PMIHL	PMIHL	RM2A
Osram ...	HL2	HL2	LP2
Pix ...	210HF	210HF	20P
Six Sixty ...	210HL	210HF	220P
Triotran ...	WD2	WD2	UD2N
Tungsram ...	HR210*	HR210*	P215*
362 ...	H2	H2	LP2

* Indicates valves used during "A.W." tests

CONDENSERS, FIXED

- 1—Lissen .0002-microfarad
- 2—Lissen .002-microfarad

CONDENSERS, VARIABLE

- 1—Tuning as described in article.
- 1—Reaction as described in article.

HOLDERS, VALVE

- 3—Lissen four-pin, type LN5006.

RESISTANCES, FIXED

- 2—Graham Farish, values: 50,000, 100,000-ohm.

SUNDRIES

- Wood for baseboard, variable condensers and coil formers.
- 18 yd. wire No. 22 gauge D.C.C. for coil and connecting.
- Tin foil and outer wrapping paper of Players' 20 packet.
- 7 ft. thin flex.

Amazing Success of the Lucerne Coils!

NINE "LUCERNE" SETS

THE following sets have been designed or adapted for the use of the "A.W." Lucerne coils. Full-size blueprints are available for all of them:—

B.B.C. National Two, page 192 of "A.W." for February 17, blueprint No. AW377a.

Big-power Melody Two, page 192 of "A.W." for February 17, blueprint No. AW338a.

Cosser Melody Maker, page 192 of "A.W." for February 17, blueprint No. AW 423.

Crystal Set, page 332 of this issue, blueprint No. AW427.

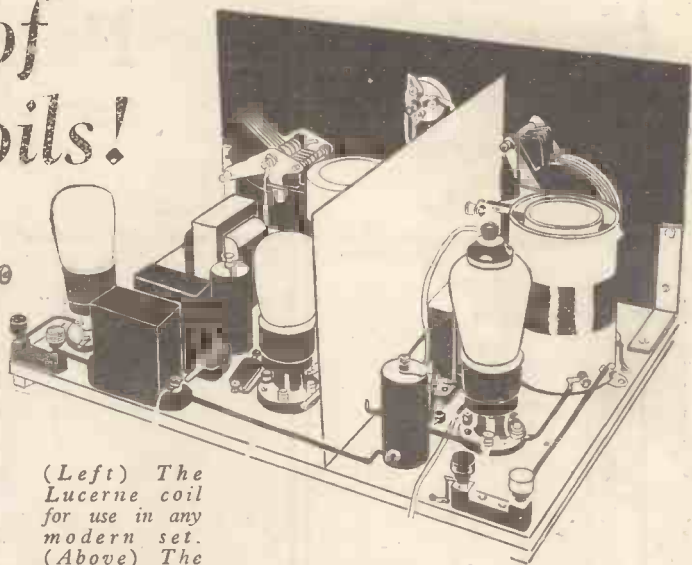
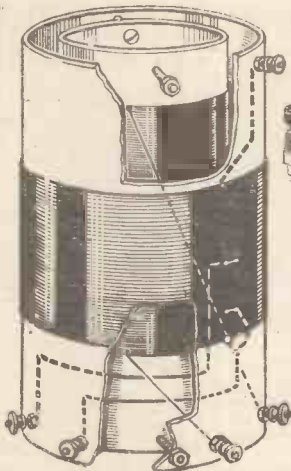
Lucerne Minor, page 307 of "A.W." for March 24, blueprint No. AW426.

Lucerne Ranger, page 239 of "A.W." for March 3, blueprint No. AW422.

P. W. H. Mascot, page 286 of "A.W." for March 17, blueprint No. AW337a.

Mullard Master Three, page 215 of "A.W." for February 24, blueprint No. AW424.

"W.M." Economy S.G.3, page 192 of "A.W." for February 17.



(Left) The Lucerne coil for use in any modern set. (Above) The Lucerne Ranger, the set in which the Lucerne coils made their debut

coils will tune easily from 180 to 650 metres—and from 850 to 2,100 metres—wavelength ranges that embrace everything of interest to the amateur—including seldom-heard Continental stations and aircraft telephony around 900 metres.

But these wide wavelength ranges by no means exhaust the advantages of the Lucerne coils. They have the further advantage that the selectivity can easily be varied by a simple adjustment to the number of aerial-coupling turns.

Normally the aerial turns are standardised at ten, but two or three turns can be added or taken away with remarkable effect—thus making the coils universally applicable to those living near to and far from high-power broadcasting stations.

These Lucerne coils, because they are wound with ample-gauge wire, and on good-sized formers, are more efficient than the average small screened coils. They therefore give you better selectivity and greater signal strength.

These tremendous advantages are

not limited to just one set—for the Lucerne coils can be used in many diverse types of receivers. They can be used in simple crystal sets, one-valvers, sets with one or two stages of low-frequency amplification, and sets with a screen-grid stage.

We have had the Lucerne S.G. Ranger and the Lucerne Minor, and very soon there will be a still more ambitious set—the Lucerne

LUCERNE COIL SUPPLIERS

ALTHOUGH they are so easy to make, many readers will prefer to buy their Lucerne coils already made up. The following four firms can supply the coils ready made exactly to the original "A.W." specification or as kits of parts for home assembly:

McDaniel & Co., 178 Mawney Road, Romford, Essex.

Ohmic Accessories, 9 Myron Place, Lewisham, London, S.E.13.

Peto Scott Co., Ltd., 77 City Road, London, E.C.1.

Wright & Weaire, Ltd., 740 High Road, Tottenham, London, N.17.

Full details for the construction of the coils was given on pages 112-114 of "A.W." for January 27 and page 248 of "A.W." for March 3.

EVERY now and then someone in this wireless game scores a really decisive success. "The Experimenters" are no exception. With characteristic enthusiasm they entered into the spirit of the Lucerne Plan, and set about designing special coils that would be at once cheap for the amateur to make for

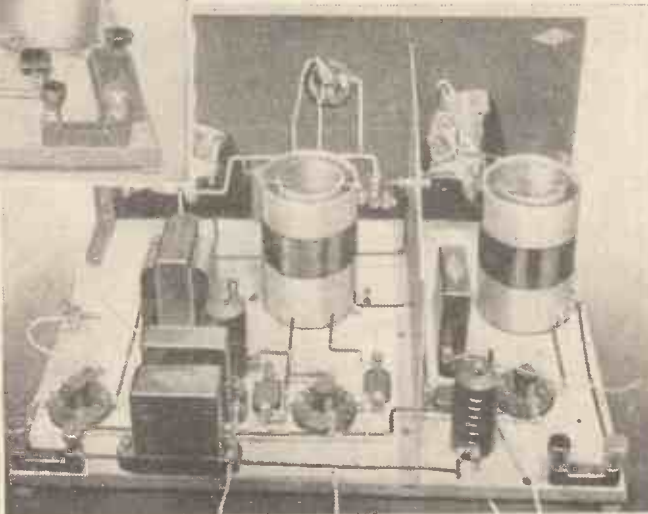


The Lucerne Minor—a "hot" two-valver using a Lucerne coil for tuning

himself and fully capable of meeting the new ether conditions.

The Lucerne coils resulted. By now every reader must be aware of their advantages. They cost only 2s. 6d. to make, and when made form the nucleus of a first-rate set for present-day conditions.

Lucerne coils strike at the heart of the problem of modern tuning. They provide, for a start, an exceptionally wide wavelength range on both the medium- and long-wave bands. With a normal 0005-microfarad condenser the Lucerne



Another view of the very popular Lucerne Ranger—a screen-grid, detector and power circuit using two of the Lucerne coils for aerial and grid tuning. It gives remarkable results

Major, with two screen-grid stages.

These sets are of "The Experimenters" own design, of course, but, as we have shown in preceding issues, the Lucerne coils can be used in many of the popular designs among kit sets and other sets described in AMATEUR WIRELESS and *Wireless Magazine*.

Simplicity of assembly is a bull point about the Lucerne coils, don't forget. Even if you know very little about making components, the instructions for making up the Lucerne coils as given in the January 27 issue of AMATEUR WIRELESS will surely convince you that it is a job anyone might tackle with confidence.

We had no wish to limit the appeal of these coils to those who make things for themselves. That is why we arranged for the Lucerne coils to be made available to all set constructors.

You can buy these highly efficient coils for very little more than the cost of making them.

Practical Hints in Set Assembly

Seven Constructional Dodges

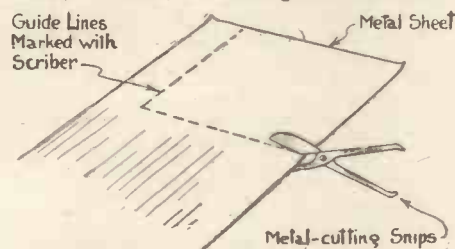


Using a brace and bit to cut a chassis hole

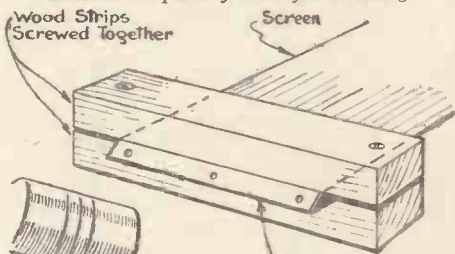
MANY of the methods adopted by engineers for metal and wood working can be utilised with advantage by the wireless amateur. In this short article we give a selection of practical constructional tips that have the merit of having been thoroughly tried out—they are not just theoretical ideas.

For a start, let us deal with one or two tips to do with metal working. You often have to cut out a piece of sheet metal for screens or baseboards, don't you? Well, do you use the right kind of cutter?

For normal gauge sheet you should use metal-cutting snips. Before using them to cut out the piece of sheet to the required shape you should, of course, mark out guide lines with a



Using metal-cutting snips for cutting out a dimensioned piece of metal for screening



How to bend a metal sheet by means of two strips of wood and a small mallet

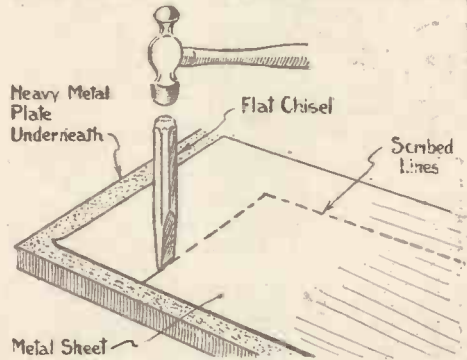
scriber. With very thin sheet you can, of course, borrow the domestic scissors.

If you are dealing with thick-gauge sheet metal, and you want to bend it for screen partitions and suchlike uses, try our hint of clamping the sheet between two flat pieces of wood screwed together. Then hammer the lip

flat with a small mallet—or a stout piece of wood will do.

Another good way of cutting thick-gauge metal sheet is shown by a further illustration. Here you use a flat chisel for the cutting. The sheet to be cut is laid flat on a heavy metal plate as shown and then the chisel is hammered along the scribed lines. If this is done carefully a neat job can quite easily be made by this method.

Now for a few hints on wood working. Often you have to cut an escutcheon hole in a



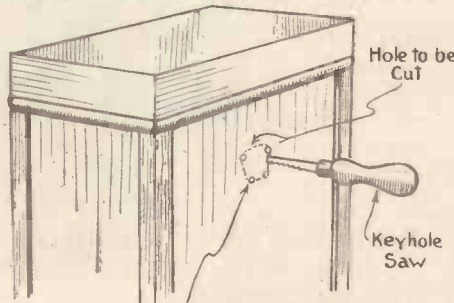
A chisel can be used to good advantage for cutting thick sheet metal. The underneath plate must be firm

panel for tuning. A hand drill can be used as shown. Scribe out the shape of the proposed hole, and then go round the inside edge with the hand drill, making a series of small holes. You can then knock out the waste piece at the centre, and trim up with a file.

On wooden-chassis sets, which are now so popular, you may want to make quite large holes to take valve holders. A brace and bit is probably the best tool for this job, as shown. A fret-saw is, of course, very useful indeed for cutting out escutcheon holes. If you possess one you will need to drill only one small hole to start the blade, which can then follow round the scribed lines of the desired cut-out.

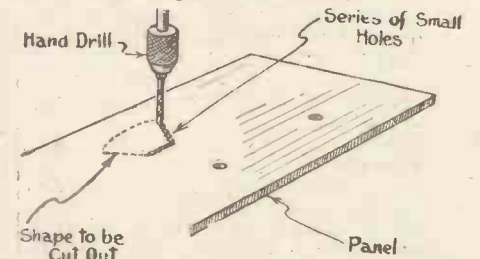
Still another very sound way of drilling a hole for an escutcheon, as in a radio-gramophone type of instrument, is to make use of a keyhole saw.

This method is shown by one of the illustrations, from which you will see that four holes are first drilled one at each corner of the

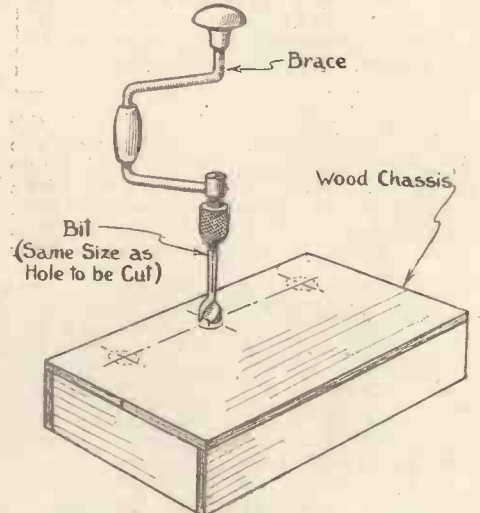


Another way of cutting an escutcheon hole—using a keyhole saw. Note starting holes for the keyhole saw blade

proposed hole. The keyhole saw is then used to cut from one hole to the next, so that when all four sides of the opening have been attacked the centre waste piece will fall away.



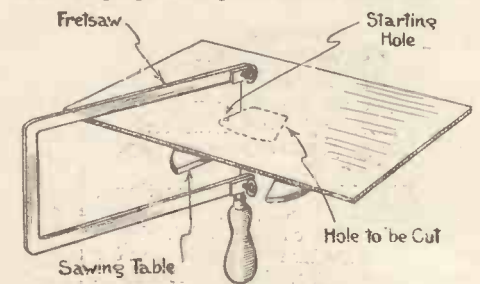
With a series of small holes drilled all round the escutcheon space, you can cut the wood without a saw



Holding this brace firmly and vertically, you can cut out large holes for a wooden chassis

Very little trimming up will then be needed to make a neat job of the escutcheon hole.

These seven tips are the first of a new series that we propose to give readers from time to



If you have a fret-saw you can make a very simple job of cutting an escutcheon hole. Note the starting hole

time. If you have any special suggestions they will be welcomed.

Our aim is to help the really keen constructor—especially the wireless amateur who is not yet conversant with the very interesting arts of metal and wood working.

New Valves with New Mountings

VALVE PINS have always been considered to be an indispensable part of the modern valve. There has never been a change in design at the pin end of the valve—not since the very early days when there were no pins at all. Most of us have been accustomed to valve pins of some sort or another; if it wasn't split pins it was banana pins, and after that solid pins were used.

New Types

These changes were fairly important, but they did not affect the man in the street to any great extent—at any rate, there was never any need to scrap existing valve holders. But with the new Mullard universal mains valves it will not be possible in any way to use up the existing type of valve holders.

This drawback sinks into obscurity when we consider the advantages these universal valves offer. I think it will be agreed that a new type of valve holder is long overdue. The existing types do not always make good contact, become loose, and sometimes it is not easy to plug in a seven-pin valve.

In addition to this, the valve takes up far too much room in the average set, and it should be obvious to everyone that without valve pins there will be a saving of at least 3/4 in. in the overall height.

Mullard's have tackled this problem in a very sensible way—by scrapping the existing methods of connection and doing away with valve pins in favour of side contacts.

Avoiding Mistakes

This is a step in the right direction, but it does not overcome the snag of bad contact through faulty valve holders. The base that they have evolved to fit the new valves is somewhat similar to the American bayonet holder with a guide on the side, so that a non-technical user cannot possibly make a



Universal double-diode of the new type

mistake in plugging in the valve.

Two bases will be marketed, designated type P and type V. The type P is 29-mm. in diameter and has eight contacts. The actual connections are made through the bottom, but the side contacts on the valve base make contact with self-cleaning springs arranged radially.

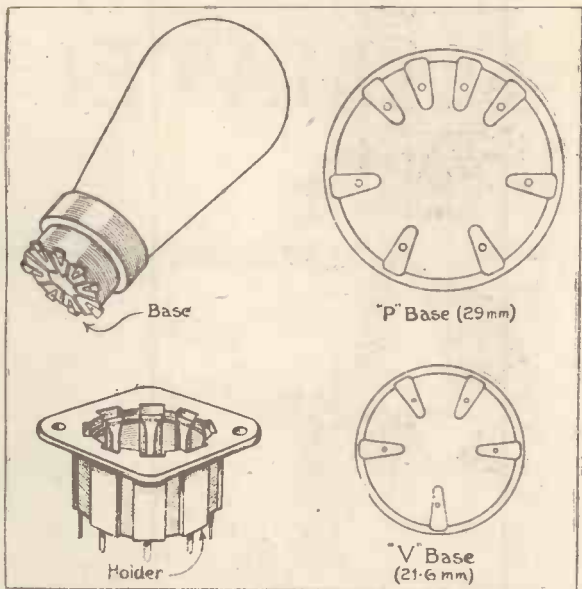
Type V is for five-contact valves, such as for double-diode triodes. This will be 21.6 mm. in width and has the contacts spaced around the base and projecting radially, as with the type P holder.

In theory there should be a decrease in valve capacity, as the contacts will now be more widely spaced. In addition to these improvements the Mullard Company have gone still further.

They have designed an entirely new range of valves of universal application, and they have many points which are of outstanding interest. To help in standardising connections in multi-electrode valves every Mullard valve of the new range has the grid brought out to the top of the

valve, including low-frequency pentodes. This grid connection, instead of being of the screw type, as it is with screen-grid valves, which have never been very satisfactory, will now be of the thimble type, as standard in America and elsewhere.

All of these valves will be much smaller than



Connections of the new type of Mullard valve, which is quite revolutionary

those already on the market, particularly the double-diode, which is only 3 1/4 in. in height, with a width of 1 1/2 in. On the average the saving in height is about 1 1/4 in., which will be very useful to makers of midget and car-radio sets.

Car-radio sets will in time become more popular, but only if they can be easily and cheaply made. Thus if the universal valves to be used in this type of receiver could be the standard mains valve, then the design of car-radio sets would be very much simplified. As the majority of cars that would want radio fitted are on the large side and have 12-volt lighting sets, it was decided to make the heater voltage 13, which would allow for any rise there might be when charging.

At this voltage the current can be kept down to 200 milliamperes, so that the same valve would prove quite suitable for series working on D.C. mains.

A half-wave rectifying valve has been evolved with a 20-volt heater, so that A.C.-D.C. sets can now be made with a standard type of valve.—K. J.

On the Short Waves

RECEPTION conditions must be looking up. I make this bold statement after looking at my mail this week, all of which contains reception logs. I think it would be better to quote some of these letters, so that you can tell how the conditions vary according to the locality.

A Newcastle listener says that on March 1 he logged HJ1ABB, Barranquilla, on a wavelength of 46.5 metres. The volume was sufficient to be heard over the prevailing static. This is pretty good going as the power used is only 200 watts. This same reader also reports VY2AM on 42 metres at R7. The reception was rather spoilt by morse interference from a nearby 40-metre amateur.

R. W. B., of West Kensington, reports that Maracay, YVR, on 16.3 metres is a colossal signal and is testing with Paris and Berlin. PLE, Bandoeng has also been heard in West Kensington, at good 'phone strength during the early afternoon. The wavelength of PLE is 15.93 metres.

The 19-metre band seems to have attracted most attention. Readers from Swansea, Darlington, Liverpool Margate and Cambridge, to mention a few, have sent in almost

identical reports. They all record reception of W2XE on 19.64 metres during the early afternoon—the earliest log was 3.30 at Darlington. W2XAD was also received, but at much greater volume in the north of England. W8XK on the same waveband has apparently been a poor signal for a long time.

Sunday, March 11, seemed to be a fruitful day for all of those readers who claim a minimum of ten American amateur stations on the 20-metre band. Most of these amateurs were heard before 4 p.m.

Unproductive Bands

For some reason or other the 25- and 30-metre bands seem to have been rather unproductive for most correspondents, except for one in Tiverton. This reader tells me that on Friday, March 9, he picked up an orchestral programme from W2XE, Wayne, New Jersey, on a wavelength of 25.63 metres.

The 50-metre band stations appear to be coming over earlier than they were, which, perhaps, accounts for the interesting fact that so many readers are commenting on the strength of the American stations on this waveband.—KENNETH JOWERS.



Note the brass contacts which supersede the ordinary "pins" in the new type of Mullard valve with special base

Conducted by H. CORBISHLEY

AMATEUR TELEVISION

Starting Television Cheaply

By KENNETH JOWERS



Pacific and Atlantic photo

An enthusiastic schoolboy with a television receiver made by himself. Any boy can make one without difficulty

IT is not absolutely essential to spend a lot of money before being able to look in to the B.B.C. 30-line television transmissions. To obtain the best possible pictures a fairly expensive cathode-ray or mirror-drum equipment is necessary, but the amateur with little or no knowledge of television would be well advised to start off with a simple disc receiver.

For £2 or so a receiver of this kind can be made up which will give quite good pictures with a minimum amount of trouble. This type of receiver is intended for the amateur constructor, because this is the only way to receive television pictures without going to considerable expense.

Construction Next Week

Next week we are going to give you constructional details of such a receiver that I have made up for about 50s.

The main components are a 20-in. Mervyn disc, a 6-volt Saunders motor, a pair of lenses and a neon tube. There are other components, such as a variable resistance, and batten holder, etc., but these are quite inexpensive and need not be of any particular make.

With this disc receiver, at a distance of 30 or 40 miles from London, the B.B.C. transmissions can be picked up regularly with only a simple type of sound receiver. The definition is not good—you can hardly expect very much from such simple equipment—but the knowledge that you acquire will be very useful later on when you graduate to a more ambitious outfit.

Everybody was rather afraid that the B.B.C. might stop these 30-line transmissions, but it seems as if they will now go on indefinitely, so that the construction of a 30-line receiver will not be a waste of money.

Of course, with television the more money you spend the better will be the results—although I have seen

has never yet seen any television images it is not a bad idea to start with these cheap parts.

After making up my original disc receiver, I experimented with various components to see just what results would be obtained, using the very cheapest parts. I bought two magnifying glasses without frames from Woolworth's for 6d. each, and when these were mounted on wooden holders the magnification was sufficient, although the percentage of distortion was increased. Anyway, results were not at all bad, considering I had saved about 14s. 6d.

I was able to pick up cheaply an old fan motor which, if allowed to warm up for about half an hour before the transmissions started, could be regulated to 750 revs. a minute without much trouble; synchronising was difficult, but the pictures could be seen.

I made a disc for 3s., but after I had finished it I realised it was not really worth the trouble—it was much better to buy a 20-in. disc already made, costing 12s. 6d. For the neon tube an Osglim indicator worked quite well, so that the whole equipment only cost about 30s.

Next week when I give the constructional

pictures on a receiver costing only a few shillings. For example, you can buy motors costing only 12s. to 15s., excellent lenses can be purchased from Woolworth's, while the Osglim indicator neon lamp, costing 2s. 6d., will give a comparatively good picture.

Of course, such equipment would not even be considered by the experienced amateur, but for the constructor who

details, you might bear these points in mind and remember that if you cannot afford more expensive components for a start try using some of the alternative ones I have mentioned. Then if you consider the results good enough swap over to the parts that I finally found to be the best.

Cheap Motors a False Economy

One of the most important components in any television receiver is the motor. Although these can be bought very cheaply, if they do not keep a steady speed throughout the whole transmission, the pictures will be ruined. It is really false economy to buy a cheap motor unless you are just going to amuse yourself.

The chassis on which the motor and disc, etc., are mounted is home constructed, and any handyman should be able to knock this up for a shilling or so. The lenses, if you buy them from Woolworth's as I did originally, can also be mounted on wood by the handyman, but if you go for the Bennett double lens-holder, then the whole job is already done for you.

This double holder, which I finally used, is rather interesting because it is totally enclosed, painted black to make it non-reflecting and is adjustable, so that you get the highest degree of magnification. The percentage of distortion with such a pair of lenses is fractional as compared with cheaper lenses. On the other hand it is at least 10s. dearer. After a few weeks on a cheap lens there is no doubt that you would change over to the better one.

Reflection of Light

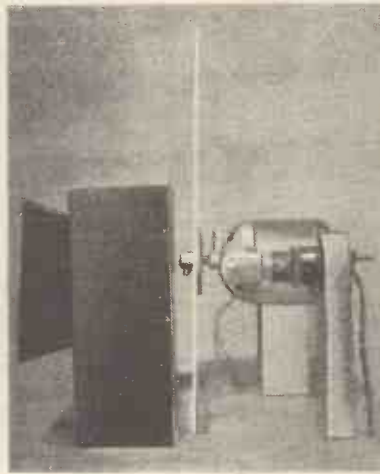
A point to remember with these lenses is that should the holders be made of metal they must be painted black, otherwise they will reflect back on to the disc. To prevent trouble of this kind it is usual to paint the disc itself black.

There are one or two different ways of mounting the neon tube, and two or three different types. You cannot do better, if money is an important consideration, to start off with the usual type of beehive neon lamp. When you are buying this lamp, explain that it is for television work and it will be supplied without the resistance that is usually incorporated, but you must not connect it across the mains without a limiting resistance, the value being shown on the carton.

I have mounted my lamp upright, as in my opinion that is the most satisfactory way, but there are others who consider that horizontal mounting is more satisfactory. Here are two points which you can determine for yourselves.



The scanning disc is seen in the background and the viewing lens is in front



How the scanning disc is arranged between the light source and the viewing lens

(To be continued next week)

Those Wireless Returns

By Bosphor
Pronz

WHY should I? And then, again, looking at it from a different angle, why shouldn't I? On the whole, I am rather more inclined to the why shouldn't I point of view. Why shouldn't I what? Return to the pages of my former triumphs, dear listener.

In other words, why shouldn't I return to wireless, I ask you? Quite the fashionable thing to do these days, return to wireless, you know.

Well! well! as with others, so with me. Once a wireless man, always a wireless man. You may leave wireless for a time, but you will never leave wireless for ever. You may even become a piano tuner, but you'll come back to wireless in the end.

Head Screwer in a Factory

I once knew a wireless mechanic who was the head screwer in a terminal factory. He was the Johnny; you know, who screwed the head on the terminal as it was passing out into the cold, cruel world. He was an artist at his work, never let a single terminal get past him without its head.

Clever, quick, deft, reliable, and happy, but, after years as a head screwer, he sought a change, and he suddenly decided to leave. The manager was broken-hearted, threatened suicide, but all to no avail, so he didn't.

My mechanic friend left the terminal factory and quickly obtained a responsible post as a mixer and blender of paste in a firm of paper-hangers. After three months of this new work, he became pasty-looking, lost his appetite and twelve pounds of his weight and his gift for repartee, so he returned to wireless.

He could not get back his old position as head screwer in the terminal factory, but he

was quite content to accept a lower post, namely, that of the screwer-on of the nut on the underneath shank of the terminal.

To accept such a post in a factory where he had formerly been head screwer meant a loss of social standing, but this he did not mind in the least, so glad was he to get back to wireless.

Another old wireless friend of mine left wireless to go into the "talkie" business. He stood the "talkies" for a year, but it never seemed the real thing to him, and he returned to wireless with one of the brightest ideas of the century. He founded an aerial monkey training school. There were brains in this school.

The idea was to train monkeys to shin up an aerial mast, thread a new rope through the pulley at the top, and bring the loose end down. Statistics showed that there were a quarter of a million ropeless aerial masts in this country alone.

My old friend calculated that one monkey could thread ten aerial-mast pulleys per day, or, working five and a half days a week—a monkey liking his Saturday afternoon off as much as any other member of the working community—fifty per week. With a fleet of a hundred trained monkeys, five thousand masts could be threaded per week.

To equip the whole of the quarter of a million derelict masts in the country would have given a year's profitable work, after which the fleet could have been taken to America. It was a great idea, but, like a good many great ideas, it had one little flaw.

The trained monkey would stop half-way up the mast to scratch, and that caused him to drop the rope. If anybody would like a couple

of hundred aerial monkeys—shares, not animals—I should be happy to oblige at a give-away price.

Sharkie is the latest of my wireless friends and neighbours to return to wireless. He is one of the most unfortunate men who ever turned a condenser dial. Nothing in wireless seems to go right for Sharkie. I'm sorry for him; very sorry.

Last week he started to dig a hole in his garden for his new aerial mast. As he works all day at his place of business, from early morning to late at night, he had to do his digging after dark, by the dim, vague light of the cloud-hidden stars (no moon last week). On the Tuesday night, when he had got a nice piece of digging done and the hole was a nice size, he dropped his fountain-pen in the hole. Of course, he could not look for the pen until Saturday afternoon came round.

The Hole Filled Up!

When, on the Saturday afternoon, Sharkie went to look for his pen, what do you think he found? Somebody had filled the hole up. Poor old Sharkie. Was he dismayed? Not he. He started to dig carefully, and he dug and dug, but he didn't dig up his pen. No, he dug up a dead cat which somebody had buried in his aerial-mast hole. Poor Sharkie.

Even that did not deter him. He had made up his mind to return to wireless, and return he would. That same night, when the family next door had gone to the pictures, he reentered the cat in their garden and then continued his own excavations. Poor Sharkie.

If you know of a more courageous return to wireless than Sharkie's, write and tell me about it.

It greatly simplifies set-building . . .

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The J.B. Linacore employs the latest type of iron-cored coils. It greatly simplifies set building, making the most of its super selective coils by accurate matching of condenser sections. Write to-day for free Blueprints of an ideal battery or mains model Linacore circuit. Enclose 2d. only for postage. For Battery receivers type B.P.B. (as illustrated). **69/6** For Mains receivers type B.P.M.

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Conducted by J. H. Reyner, B.Sc., A.M.I.E.E.

Our Tests of New Apparatus



Eelex short-wave tuning coil

EELIX SHORT-WAVE COIL

THE Eelex reversible short-wave coil and base are made from moulded bakelite, the coil former being ribbed in the usual manner. Eight pins are fitted, and the connections are so arranged that by reversing the coil in the sockets the wave range covered is changed from long to short, the makers' figures being 25-60 metres on long range and 15-30 metres on the short range.

It is claimed that this method of coil changing is more efficient

than using a switch, as two separate windings are employed and losses due to the switching out of an unwanted winding are avoided.

Test Results.—The coil was tested in conjunction with a simple two-valve receiver and the wave-ranges covered were found by measurement to be as follows:—

Long range, 25-61.5 metres.

Short range, 16.5-39 metres. The performance was satisfactory, the only criticism being that the aerial coupling is rather tight, this condition giving rise to a number of dead spots on both ranges. This, however, can be easily overcome by fitting a small variable condenser in series with the aerial lead.

The coil should prove useful to those readers constructing short-wave receivers or converters:

Makers: J. J. Eastick & Sons. Price: 7s. 6d., complete with base.

B.H. DUAL ADAPTOR

THE B.H. British dual plug is an extremely useful article which should find a ready sale

amongst those who in the past have been troubled with separate adaptors when using the receiver on two-pin sockets or bayonet type fittings for supplying current.

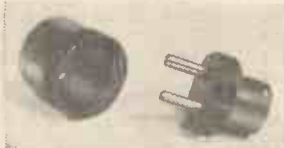
The adaptor is made of moulded bakelite, and the removable cover reveals a two-pin plug at one end and a bayonet fitting at the other.

A bakelite disc, held by one screw, is removed for connecting purposes, and the leads are taken out from the side of the disc and then up through the cover.

The pins were found to be of the usual 5-ampere size, and the bayonet fitting to be for the standard lamp-holders. Good contact was obtained.

Makers: B. H. British Electrical Works (distributed by Harwell, Ltd.).

Price: 8d.



B.H. adaptor for mains receiver

BLOCK HIGH-TENSION ACCUMULATOR

A VERY compact high-tension accumulator made by Block Batteries, Ltd., is now available.

The unit measures 15 in. by 3 1/2 in., and is 4 1/4 in. deep, which for a 60-volt unit is extremely small. A special indicating filler is provided with each battery.

The plate construction follows the same principle as in the low-tension Block accumulator.

Test Results.—The battery was discharged at an average current of 42 milliamperes.

This gave an actual capacity of 2,350 milliamperes hours, which can be considered very satisfactory.

On a 30-milliamperes discharge the battery should stand up for four to six weeks of normal use without recharging, which is an excellent performance for so compact a unit.

Makers: Block Batteries, Ltd. Price: £1 17s. 6d.



Block high-tension accumulator; this is a 60-volt unit

Medium-wave Broadcasters

This week we give details of all the important European medium-wave stations. Next week we shall publish a list of short- and long-wave transmitters.

Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)
201.1	1,492	Bordeaux-Sud-Ouest	France	.3	271.2	1,106	Vitus (Paris)	France	1.0	377.4	795	Barcelona (EAJ1)	Spain	.8
203.5	1,474	Flymouth	Great Britain	.3	271.7	1,104	Naples	Italy	1.5	382.2	785	Leipzig	Germany	120
203.5	1,474	Bournemouth	Great Britain	1	271.7	1,104	Madona	Latvia	15.0	386.6	776	Toulouse PTT	France	.7
204.8	1,465	Pecs	Hungary	1.25	272.9	1,099.5	Madrid EA17	Spain	3.0	391.1	767	Midland Regional	Great Britain	25
206	1,456	Fecamp	France	20.0	276.2	1,086	Falun	Sweden	.5	395.8	758	Katowice	Poland	16
207.1	1,448.5	Agen	France	.5	277.1	1,082.6	Magyarovar	Hungary	1.25	396.7	756	Parade	Portugal	5.0
208.8	1,438	Miskolez	Hungary	1.25	277.2	1,082	Zagreb	Yugoslavia	.75	400.5	749	Marseilles PTT	France	2.5
209.5	1,432	Beziers	France	1.5	278.6	1,077	Bordeaux PTT	France	13	402.7	745	Parade	Portugal	5.0
209.9	1,429	Newcastle	Great Britain	1	280.9	1,068	Tiraspol	U.S.S.R.	10	405.4	740	Munich	Germany	100
211.3	1,420	Tampere	Finland	1.2	283.3	1,059	Bari	Italy	20	410.4	731	Seville	Spain	1.5
215	1,395.4	Radio Lyon	France	.7	285.7	1,050	Scottish National	Great Britain	50	410.4	731	Tallinn	Estonia	11
218.2	1,375	Basle, Berne	Switzerland	.5	288.6	1,040	Leningrad (2)	U.S.S.R.	100	410.4	731	Madrid (España)	Spain	1.0
221.1	1,357	Turin (2)	Italy	.2	288.6	1,040	Rennes PTT	France	1.3	415.5	722	Kiev	U.S.S.R.	36
222	1,351	Dublin (2)	Irish Free State	1.2	291	1,031	Heilsberg	Germany	60	420.8	713	Rome	Italy	50
222.6	1,348	Koenigsberg	Germany	.5	293.5	1,022	Barcelona (EAJ15)	Spain	2.0	426.1	704	Stockholm	Sweden	55
222.6	1,348	Milan Vigentino (2)	Italy	.7	296.2	1,013	North National	Great Britain	50	431.7	695	Paris PTT	France	.7
224	1,339	Montpellier	France	.8	298.8	1,004	Bratislava	Czechoslovakia	14	436.1	687.8	Fredriksstad	Norway	0.7
224.1	1,338.8	Lodz	Poland	1.7	301.5	995	Hilversum (Huizen prog.)	Holland	20	437.3	686	Belgrade	Yugoslavia	2.8
225.6	1,330	Hanover and other	Germany	1.5	304.3	986	Genoa	Italy	10	443.1	677	Sottens	Switzerland	25
227.1	1,321	Hamburg relays	Germany	1.5	304.3	986	Cracow	Poland	1.7	449.1	668	North Regional	Great Britain	50
230.2	1,303	Danzig	Hungary	1.25	304.3	986	Wroclaw	Poland	1.7	455.9	658	Langenberg	Germany	60
231.8	1,294	Linz and other	Germany	.5	307.1	977	West Regional	Great Britain	50	463	648	Lyons PTT	France	15
		Vienna relays	Austria	.5	312	961.4	Grenoble PTT	France	3.0	470.2	638	Prague (I)	Czechoslovakia	120
233.5	1,285	Aberdeen	Great Britain	1	312.8	959	Poste Parisien, Paris	France	60	476.9	629	Trondheim	Norway	1.2
236.8	1,267	Nurnberg	Germany	.2	315.8	950	Breslau	Germany	60	483.9	620	Brussels (I)	Belgium	15
238.5	1,258	San Sebastian (EAJ8)	Spain	.6	318.8	941	Algiers	North Africa	13	491.8	610	Florence	Italy	20
238.5	1,258	Rome (III)	Italy	1.0	318.8	941	Goeteborg	Sweden	10	499.2	601	Sundsvall	Sweden	10
240.2	1,249	Juan-les-Pins	France	2.0	325.4	922	Brussels (2)	Belgium	15	499.2	601	Rabat	Morocco	6
241.9	1,240	Cork	Irish Free State	.5	325.4	922	Brno	Czechoslovakia	35	506.7	592	Vienna	Austria	100
243.7	1,231	Gleiwitz	Germany	5	328.6	913	Limoges PTT	France	.7	514.4	583.2	Riga	Latvia	15
245.5	1,222	Trieste	Italy	10	331.9	904	Hamburg	Germany	100	522.9	574	Muhlacker	Germany	100
247.2	1,213	Lille PTT	France	1.4	335.2	895	Radio Toulouse	France	8	531	565	Athlone	Irish Free State	.60
249.2	1,204	Prague Strassnice (2)	Czechoslovakia	3	335.2	895	Helsinki	Finland	10	539.6	556	Beromunster	Switzerland	60
251	1,195	Frankfurt-am-Main and relays	Germany	17	338.6	886	Graz	Austria	7	549.5	546	Budapest	Hungary	120
253.2	1,185	Kharkov (2)	U.S.S.R.	35	342.1	877	London Regional	Great Britain	50	559.7	536	Wlpiur	Poland	16
255.1	1,176	Copenhagen	Denmark	10.0	345.6	868	Poznan	Poland	17.0	569.3	527	Vilpiur	Poland	13.0
257.1	1,167	Monte Ceneri	Switzerland	15	349.2	859	Strasbourg	France	15	569.3	527	Ljubljana	Yugoslavia	.7
259.1	1,158	Moravska-Ostrava	Czechoslovakia	11	350	857	Bergen	Norway	1	578	519	Innsbruck	Austria	.5
261.1	1,149	London National	Great Britain	50	350.7	853.3	Porsgrund	Norway	25	578	519	Hamar	Norway	.7
261.1	1,149	West National	Great Britain	50	352.9	850	Valencia	Spain	3.0	578	519	Oulu	Finland	1.2
263.2	1,140	Turin (I)	Italy	.7	356.7	841	Benic	Germany	100	578	519	Oulu	Finland	1.2
265.3	1,131	Hoerby	Sweden	10	360.6	832	Moscow (4)	U.S.S.R.	100	696	431	Göteborg	Sweden	.6
267.4	1,122	Belfast	N.Ireland	1	361.4	830	Radio LL Paris	France	1.2	726	413.5	Geneva	U.S.S.R.	1.5
267.5	1,117	Nyiregyhaza	Hungary	6.25	364.8	823	Bucharest	Rumania	12	748	401	Moscow	U.S.S.R.	20.0
269.5	1,113	Kosice	Czechoslovakia	2.5	368.6	814	Milan	Italy	50	765	392	Ostersund	Sweden	.6
					373.1	804	Scottish Regional	Great Britain	50	824	364	Stolenski	U.S.S.R.	1.0
					377.4	795	Lwow	Poland	21.5	840	357	Budapest (II)	Hungary	3.0
										845	355	Rostov (Don)	U.S.S.R.	20.0

NOTE.—The following wavelengths are common to several transmitters: 206 m. (1,455 kcs.); 207.3 m. (1,447 kcs.); 208.6 m. (1,438 kcs.); 211.3 m. (1,420 kcs.); 1,402 kcs.); 218.2 m. (1,375 kcs.); 221.1 m. (1,357 kcs.); 225.6m.214 m. (1,330 kcs.); 228.7 m. (1,312 kcs.); 235.1 m. (1,276 kcs.); 236.8 m. (1,267 kcs.); 251 m. (1,195 kcs.).

Criticisms by WHITAKER-WILSON

My Broadcasting Diary

Sunday

I SEE some of the critics have been saying we don't want Shakespeare. Idiots! *As You Like It* was as I liked it, anyhow. What's more I should like some more of it.

Finished off my evening with a spot of Strauss. That Alpine Symphony appealed to me immensely.

Modern, but reasonably so.

Monday

IN a lowbrow mood to-night. Consequently I enjoyed those Café Colette fellers. Think them about the best proposition the B.B.C. has offered in the way of light orchestras. Enjoyed the old bean who did all the talking.

Not altogether sure that I really appreciate what showmanship is. That's another thing all the papers are talking about. What is showmanship? Perhaps what the aforesaid old bean did is it. Is it?

Tuesday

BIG BUSINESS on to-night. The music not too bad, but not so good as I should have expected from Johnny "I Cover the Water Front" Green. Nor, to be candid, was the book quite so good as I should have expected from Johnny "Songs from the Shows" Watt.

Well produced though. Yes, John; quite well produced. Think the Carlyle Cousins made the best effect, on the whole. Suppose this is the sort of faint praise that damns a show. Sorry, but it must be damned then. Can't be any kinder to it.

Wednesday

VAUDEVILLE excellent, but the right people were in it. Liked Yvette Darnac, but I always like her. Also Leonard Henry, but same to him. Again, same to Clapham and Dwyer.

Before I forget it. Note for Charles Brewer. Will he kindly absorb Ronald Gourley into that *Tea Mixture* of his? On one condition, though. Ronald is not to sing or do funny things with a piano and what the audience gives him to play about with—he is to whistle.

I have never heard such beautiful whistling. Most of the siffleurs give me the impression they diet on bird-seed. Gourley gives me the impression he has a beautiful personal musical instrument which he uses with the greatest artistry.

Been listening to *Wozzeck*. Very nearly *Wozzeck*, but have recovered sufficiently to *Diszeck* it in another page. See same.

Thursday

LIKED Henry's Hall Marks. Also the saucy way he announced everything. Part of a brighter Hall scheme, I imagine. Think we can all congratulate him on two years of hard work and wish him the best of luck in the future.

If we wish him luck in finding some really decent tunes we shall do ourselves a good turn at the same time.

Friday

QUITE entertained by the three gentlemen who talked about fire-walking to-night. May possibly take it up as a hobby.

I wish all these professors, colonels and folks who occasionally come to the microphone would practise reading aloud before they come, and get someone to criticise their inflection. And can't the announcer tell them to drop each sheet of their scripts on to the carpet instead of rattling them about near the microphone? Like a bonfire crackling.

Saturday

JOHN SNAGGE made his usual excellent commentary on the Boat Race, but the result of it gave me the Blues.

Tea Mixture not quite up to the earlier ones. Largely the fault of the compère, who wasn't a bit funny. The rest were quite good. Compèring is an art in itself and very difficult to acquire. However, Mr. Brewer need not despair. Everyone, I know, agrees he is on the right lines.

A good vaudeville. All good. Florence Oldham is an acquisition to any variety programme because she varies the make-up of her own contribution. Don't want them to spoil her by too frequent appearances, but she can be written down as a good person to have in reserve when a programme needs lifting up.

Bern Ecks is a newcomer. His second broadcast. My feeling is that he is one of the comedians of the future. He has set a style for himself. If he keeps up this idea of addressing himself to supposed voters, or something equally well defined, we shall get to know what to expect from him. That is how microphone personalities are made.

Jack Collings won me to a xylophone. That's the first time I have been able to say as much.

Reason: he treated the instrument melodically and not merely rhythmically. His is a beautiful xylophone and he played it with real musical feeling. I have no doubt he is a good musician. Hope he comes again.



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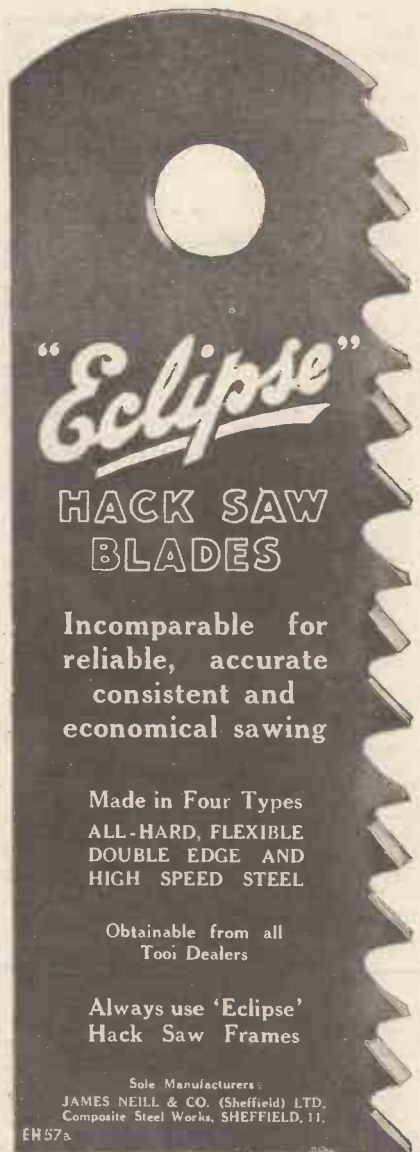
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Startling New Developments in Television

Some startling new developments have recently taken place. Full details of two particularly important movements are explained in the April issue of

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**More Lucerne
Re-shuffling**

By JAY COOTE

THE Lucerne Plan is still in a state of flux and is liable to remain so for some little time to come, as the more the table of frequencies is discussed, the more opportunities appear to be given for revision.

As to the long-wave band, no further amendments are likely to be suggested until June, when, at the London meeting of the I.B.U., it may be possible to judge how the changed allocations work out. But in the medium-wave band we are likely to find a certain amount of reshuffling, and in particular in France.

P.T.T., Grenoble, which, shifting from 309.9 metres, has been working on 312 metres, has complained that its broadcasts have been swamped by Poste Parisien. Even on the higher frequency, interference has existed. To mitigate the trouble it is suggested that Poste Parisien should exchange channels with Breslau, a move which would be quite agreeable to the German station.

Protests from Private Stations

In the meantime, protests have also been lodged with the French authorities by most of the privately-owned transmitters in regard not only to the channels allotted to them, but also in respect of the veto to use greater power.

The Ministry of Posts and Telegraphs is considering the loan of some of the French exclusive wavelengths pending the completion of the new State transmitters under construction.

It may only be a temporary loan, but it would permit such stations as Radio Toulouse to use their full power—in this instance, 60 kilowatts. Radio LL, Paris, which has arbitrarily changed to 361.4 metres (830 kilocycles), may be closed down; what is to happen to Vitus on 271.2 metres is not known. France, notwithstanding the large number of channels given to her by Geneva, has not yet been able to bring order into her household.

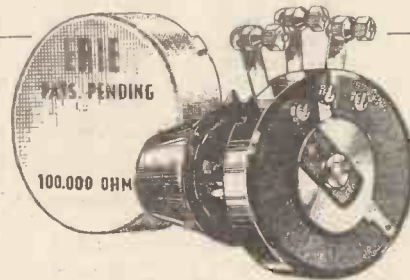
The latest rumour concerning Eiffel Tower is to the effect that the power of the station will be reduced to 10 kilowatts and that it will work on 206 metres, where we now find Radio Normandie! In the meantime, France's oldest station is operating on 1,389 metres, namely, on the new channel offered to Motala!

New Cairo Transmitter

It is doubtful whether we shall hear the forthcoming tests of the new Cairo 20-kilowatt transmitter, as it is compelled to share the Brussels No. 1 wavelength; if we do it will be only when the latter is not working—possibly in the early morning. Bear in mind that Egypt works to Eastern European time, namely, two hours ahead of G.M.T.

The news that the B.B.C. has decided to adopt the 24-hour clock system with the advent of British Summer Time, on April 22, is undoubtedly good. It will assist greatly in determining, without the addition of the prefixes a.m. or p.m., at what time a transmission really does take place. When dealing with correspondents' logs, a problem I have never been able to solve with the old 12-hour clock system has been to decide whether, say, Sunday 1.5 a.m. was the night of Saturday-Sunday or whether they wished to indicate Monday morning; Monday 01.05 would make the matter perfectly clear.

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No Revolt at the B.B.C.!

See To-day's issue of RAD:O PICTORIAL, Price 2d. for an exclusive article which reveals the truth.

"Wozzeck" Cost Us £800!

By WHITAKER-WILSON

PARIS would have none of it. A German opera rarely succeeds there, but this one came in for rough handling.

As a matter of fact, to be fair to it, *Wozzeck* has been performed successfully on the Continent about twenty-five times.

As a spectacle it seems to be fairly attractive. The plot is one that suits Continental minds. The story, however, would not bear translation into English—at least for broadcasting purposes.

However, the B.B.C. overcame that little difficulty by performing it in German, and particular people like you and myself were not in the least shocked.

Covered with Glory

As far as it is possible to judge a broadcast performance of a work of this kind, the orchestra, the singers, and Dr. Boulton covered themselves with glory. They gave a fine rendering of the world's most difficult and most dissonant opera. The performance was coached by an expert. Mr. Prerauer was, seemingly, the only man in Europe (except the composer) who had the slightest idea how the thing should go.

I had an opportunity of examining the score. Most of it seemed to me to bear very little relation to music at all. Mere noise. The melodic line of some of the singing parts must have teased our singers, but the fact that they sang so well proves it did them good. No doubt everybody concerned is the better technically for having tackled such a work.

£800 seems a heavy price for these good people's tuition. Of course, the B.B.C. can always say there was an alternative programme. There was a very good one, with people like Leonard Henry, Clapham and Dwyer, Yvette Darnac, and Ronald Gourley in it. Their little affair cost nothing like £800.

The inevitable answer that we all have switches to our sets is not good enough. We know that, but we want to switch on, not off, to enjoy broadcasting.

The whole question of hyper-modern serious music is one that should be brought under review. First because it is not popular.

In the Minority

Nobody would dare to argue that serious music listeners are in the majority. The actual facts are that they are very much in the minority. Queen's Hall is nothing like full for the Wednesday Symphony Concerts. Indeed, I heard a rumour that they will be discontinued next year because they have not paid this.

Also it is a fact that out of the small minority devoted to serious music a very small proportion will listen to hyper-modern works.

There can be no argument in favour of spending £800 to perform a concert version of an opera totally unsuited to broadcasting just to entertain a minority of a minority.

The second reason hyper-modern music should be brought under review is because it is technically unsound for broadcasting. Strong dissonances are far stronger and far more offensive by wireless than in places like Queen's Hall.

Hyper-modern music is no good to broadcasting. The B.B.C. would do a far far better thing to ignore it altogether. That might mean that it would die out entirely.

To spend £800 on a hideous work with hardly a redeeming musical feature in it is sheer stupidity. The time could have been better spent and the money could have been devoted to four or five first-rate variety shows.



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REPAIRS to Loud-speakers, Transformers, and Head-phones, 4/- each; Blue Spots, 5/-. Moving Coils a speciality. Cones fitted, Eliminators and Sets quoted for. Satisfaction guaranteed. Prompt service. Inquiries invited. Terms to trade.—Loud-speaker Repair Service, 5 Balham Grove, London, S.W.12. Battersea 1321.

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Will every querist please observe the following revised rules?

Please write concisely, giving essential particulars. A fee of one shilling, postal order (not stamps), a stamped, addressed envelope and the coupon on this page must accompany all queries.

Not more than two questions should be sent at any time.

The designing of apparatus or receivers cannot be undertaken.

Slight modifications of a straightforward nature only can be made to blueprints. For more serious alterations the minimum charge is 2/6.

Blueprints supplied by us will be charged for in addition, but of course, readers may send their own blueprints for alteration.

Modifications to proprietary receivers and designs published by contemporary journals cannot be undertaken. Readers sets and components cannot be tested by us. Queries cannot be answered by telephone or personally. Readers ordering blueprints and requiring technical information in addition should address a separate letter to the Information Bureau and should see that their remittance covers the price of the Blueprint and the amount of the query fee.

We do not answer queries in cases where the fee is omitted.

Queries should be addressed to the Query Dept., "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.

Listeners' Letters

THERMION'S BATTERY TEST

To the Editor, AMATEUR WIRELESS.

YOUR correspondent H. A. Barber, of Wealdstone, in his letter on page 311 of AMATEUR WIRELESS dated March 24 evidently does not appreciate the amount of laboratory work I have done on batteries during the past few years.

Some years ago the Burgess Battery Co., of America, asked me to carry out systematic tests of every available battery in this country. Not less than four samples of each type and size were purchased for me to carry out these special tests.

As Mr. Barber surmises, this cost a lot of money. Actually the cost ran a long way into four figures. So far from testing one battery at a time, I had a special laboratory with an assistant, and the number of batteries under test at any given time was actually about fifty.

This work came to an end only when all the batteries had been put through systematic life tests. Since then I have carried on with my own tests, so that I can confidently say that there are very few batteries on the market to-day that have not been through my laboratory.

London, E.C.4. [1045]

GOOD ONE-VALVE RESULTS

IN September, 1928 (I think I am right in the month) you published in AMATEUR WIRELESS a one-valve set called The Beginner's One. This set I made up, with excellent results.

In 1933 I made the B.B.C. Official One. Last night I gave it a real try-out, and received no less than thirty stations. Of course, some were very weak.

Stations like London Regional, North, National, Scottish Regional, Radio Toulouse Milan, Athlone, Turin, West Regional, Midland Regional, came in at very good strength.

The valve is a Triotron general-purpose. The wire on the coil is a gauge thinner owing to the former being larger than the original one. The variable condenser is .0003 microfarad instead of .0005 microfarad.

I am now thinking of making the Lucerne Ranger. H. Ash. Lincoln. [1046]

Notes and Jottings

MORE orders for broadcasting stations have been placed with firms in this country. Standard Telephones & Cables, Ltd., have an order to build, for the *Journal de Brazil*, a 10-kilowatt transmitter. It is operated entirely from A.C. mains.

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Portable Short-wave One AW354

TWO-VALVE SETS (1s. each)

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"A.W." Iron-core Two (D, Trans) AW395
"A.W." Iron-core Two with Q.P.P. AW396
Consolectric Two (D, Pen) AW403
Big Power Melody Two, with Lucerne Coils (SG Trans) AW338A
B.B.C. National Two, with Lucerne Coils (D, Trans) AW377A
Screen-grid Two (SG Det, Trans) WM289
A Two for 7 Metres (D, Trans) WM1295
New-style Radiogram (D, Trans) WM1299
A.C. Quality Gem (D, Trans) WM312

THREE-VALVE SETS (1s. each)

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S.S.3 (A.C.) (SG, S.G. Det, Pen) AW390
"Up-to-the-minute Three" with Class B, 1/6 AW384B
Class-B Three (D, Trans, Class B) AW386
A.C. Triodyne (SG, D, Pen) AW399
Home-built Coil Three (SG, D, Trans) AW404
Fan and Family Three (D, 2LF) AW410
£5 5s. S.G.3 (SG, D, Trans) AW412
A.C.-D.C. Universal Three (SG, Det, Pen) AW414
1934 Ether Searcher (SG, Det, Pen) Baseboard AW417
1934 Ether Searcher (SG, Det, Pen) Chassis AW419
Lucerne Ranger (SG, Det, Trans) AW422
1933 Economy S.G. Three (SG, D, Trans) WM306
A.C. Calibrator (SG, D, Pen) WM309
£6 6s. Radiogram (D, RC, Trans) WM318
Simple-tune Three (SG, SG Det, Pen) WM327
Tvers Iron-core Three (SG, SG Det, Pen) WM330
I.C.B. Three (D, LF, Class B) WM333
Economy Pentode Three (SG, D, Pen) WM337
Three-range Three (SG, D, Pen) WM336

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"Words and Music" Radiogram de Luxe (2SG, D, Q.P.P.) WM307a
Home Short-waver (SG, D, RC, Trans) W 4311
Empire Short-waver (SG, D, RC, Trans) WM313
Merrymaker Super (A.C. Super-het) WM345
1934 A.C. Quadradyne (2 SG, D, Pen) WM349
Lucerne Straight Four (SG, Det, Trans) WM350
Home-lover's New All-electric 4 for A.C. mains (SG, D, Trans) AW383
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The Etherdyne (Super-het) AW406
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Add-on Band-pass Unit AW359
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Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of most of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine." Address letters:

Amateur Wireless Blueprint Dept., 58-61 Fetter Lane, London, E.C.4

Amateur Wireless

INFORMATION BUREAU COUPON
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FILMING AMONG the DEVIL DANCERS!



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How would you like to meet the pleasant-looking gentleman on the left, in the dark? W. H. O. Sweeney did!

In the April "Wireless Magazine" Mr. Sweeney describes his adventures in Tibet with picture camera and sound apparatus. You'll enjoy every word of this thrilling article.

This month's issue marks the commencement of a new section dealing with home talkies. It is a fascinating hobby and one that will interest you as it is closely linked to radio and television.

In the same issue you will find building details of two sets—the SPECTRUM portable and a super-het receiver for use on either A.C. or D.C. mains.

Altogether this splendid April issue contains over 40 articles; it is, in fact, as good a shillingsworth as money can buy. Get a copy to-day.

SOME OF THE CONTENTS OF THE APRIL ISSUE

FOR THE CONSTRUCTOR

- The Spectrum Portable. By the "W.M." Technical Staff.
- Wireless Jobs Made Easy for Mr. Everyman. By R. W. Hallows.
- The Universal Merry-maker. By S. Rutherford Wilkins and the "W.M." Technical Staff.
- Touring Europe with the Universal Merry-maker.

TECHNICAL FEATURES

- New Uses for Metal Detectors.
- Mains Transformers and Low-frequency Chokes to Make at Home. By Marcus G. Scroggie, B.Sc., A.M.I.E.E.
- Screened Pentodes as Low-frequency Amplifiers. By J. H. Reyner, B.Sc., A.M.I.E.E.
- Our tests of New Sets. By the "W.M." Set Selection Bureau.
- Portadyne Battery Super-het—Model B72.
- Telsen Model 474 A.C. Receiver.
- R.G.D. Radio Gramophone—Model 1231.
- Kelster-Brandes Model 888 Super-het.
- Marconiphone Battery Four—Model 285.
- A New Tone Compensator.
- More About the High-frequency Stage. By Percy W. Harris, M.Inst.Rad. E.
- Tests of New Apparatus:
- New Circuit Tester.

GENERAL ARTICLES

- Guide to the World's Broadcasters. By Jay Coote.
- World's Broadcast Wavelengths.
- A Year of Empire Broadcasting. By Alan Hunter.
- Blind Flying on Radio Beams. By Morton Barr.
- Radio Medley. A Radio Fan's Causerie. By BM/JPRESS.
- Secrets of Radio Playwriting.
- On the Crest of the Waves. By Jay Coote.
- Machinery Behind Your Broadcasting. By Derek England.
- Reports on Famous "W.M." Sets.
- Programme-building Step-by-step. By Whitaker-Wilson.
- Catching Those Foreigners! By Irvine Foster.
- Radio Kaunas.
- Broadcast Music of the Month. By T. F. Henn.
- And Now Home Talkies.
- Talkie Equipment for the Home.
- Who Can Supply the Gear?
- News of the Short Waves. By Kenneth Jowers.
- Short Waves and the Super 60.
- Choosing Your New Records. By Whitaker-Wilson.

TELEVISION SECTION

- A New Television Eye. By G. S. Scott.
- New B.B.C. Television Studios.
- Getting the Best Results from Your Television Receiver.



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Some members of the orchestra that provides music for the devil-dancers in Tibet



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