SIMPLE but ASTONISHING EXPERIMENTS with a CATHODE-RAY TUBE

Amateur Wireless

and Radiovision

3d Every Wednesday

WHEN TO LISTEN on the SHORT WAVES

HIGH SPOTS IN THE PROGRAMMES

CHRISTMAS SHORT STORY

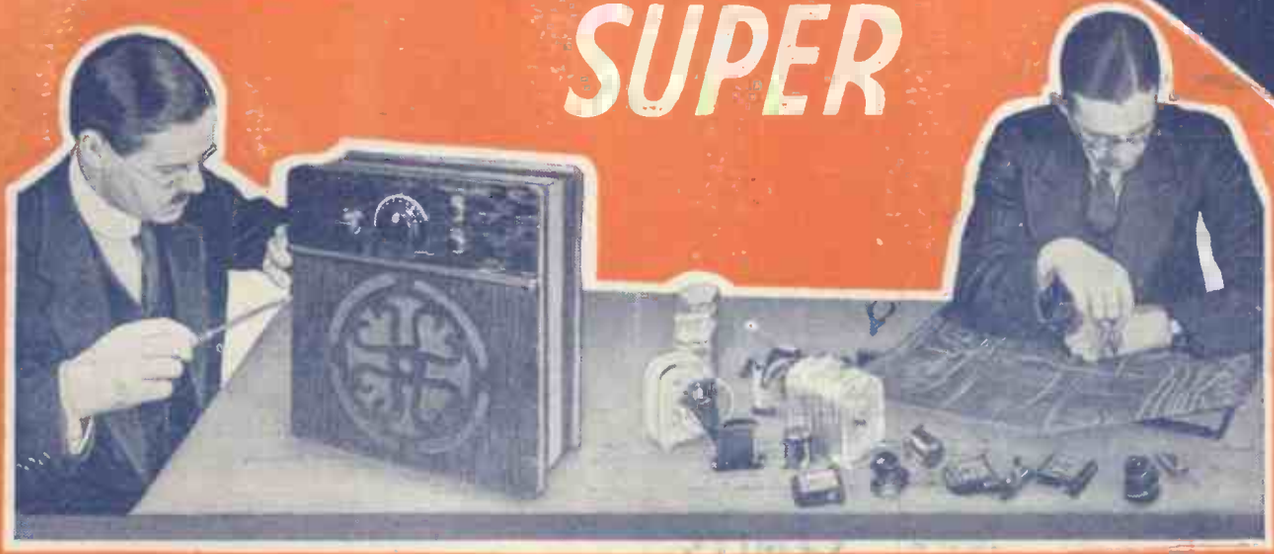
MYSTERY AT BISAMBERG

SHORT CUTS to SUCCESS in SET BUILDING

and

ASSEMBLING the 1934 CENTURY SUPER

Special Article by Percy Harris



Vol. XXIII. No. 601 Registered at G.P.O. as a newspaper December 16, 1933

What's happening now in-

Build with your own hands a set on which you can hear the news and views of all the world DIRECT!

At last the day of All-World Radio has arrived, and you can build with your own hands the first receiver to give you not only England and Europe, but America and Australia direct. The Lissen All-Wave All-World Skyscraper 4 tunes from 12 to 2,100 metres. It gives you all the ordinary British and Continental programmes you can desire, and in addition stations all over the world which broadcast news and views and entertainment on the Short and Ultra Short wavelengths. These Short Wave stations are receivable on this Lissen All-Wave All-World Skyscraper at truly amazing ranges—Melbourne, Australia, at almost 12,000 miles, Johannesburg at 6,000 miles, Sydney, Australia, at 12,000, Pittsburg, Pennsylvania at 4,000 miles—these and many more of which the ordinary listener cannot hear even a whisper.

CHASSIS KIT COMPLETE WITH FOUR VALVES £5·12·6

And remember you get these stations through Double Balanced Pentode Output giving brilliant reproduction on a Moving Coil Speaker—as much power as a Mains Set from ordinary high-tension batteries

ULTRA-SHORT-SHORT MEDIUM & LONG WAVES

Lissen have made this All-Wave All-World radio available to Home Constructors first, because it brings back the thrill of conquest to hear America and Australia direct on a set you have built yourself. It makes you an enthusiast to realise what a wonderful thing you have created!

And when you see the Great Free Chart of the All-Wave All-World "Skyscraper" 4, which tells you how to build it and how to work it and why it gives such marvellous results, you will agree at once that it will be wise of you to build for yourself rather than buy a factory assembled receiver which cannot give you these new and intriguing short-wave stations.

The FREE CHART simplifies everything; there are pictures of every part, with every wire numbered, every hole lettered, every terminal identified. YOU CAN'T GO WRONG! But get the Chart and see for yourself—then build the Lissen All-Wave All-World "Skyscraper" 4, the SET THAT SPANS THE WORLD!

THE SET THAT SPANS THE WORLD

GREAT CHART FREE POST THIS COUPON!

To LISSEN, LTD., Publicity Dept., ISLEWORTH.
Please send me FREE copy of All-Wave All-World "Skyscraper" Chart.

Name .....

Address .....

..... A.W.2034

LISSEN

ALL-WAVE ALL-WORLD "SKYSCRAPER" 4

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

No. 601. Vol. XXIII. DECEMBER 16, 1933

Amateur Wireless AND RADIOVISION

Britain's Leading Radio Weekly for Constructor, Listener and Experimenter

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News from Broadcasting House

By Our Special Commissioner

Phyllis Makes Good

DANCE-BAND fans, please note: our Phyllis, whose surname is Robbins, has passed from her probationary period with Henry Hall. She has emerged from her broadcasting trials with great credit.

We may expect Phyllis to become as much a fixture with Henry Hall's band as the tireless Les Allen, the official male vocalist.

Phyllis Robbins

Christmas Dance Music

HENRY tells me that over the Christmas period of broadcasting he intends to cater for the masses and not for the high-temperature enthusiasts.

We shall hear all the popular hits of the day during Henry's Christmas Day date, from 10.30 to 12 p.m., and from 9.20 to 10.30 on Boxing Day.

"Push back the chairs and roll up the carpet," will be Henry's Christmas inducement for you all to dance.

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Don't Mis-tune

"SOME of the wavelength changes under the Lucerne Plan are so small," said an engineer to me at Broadcasting House, "that perhaps some listeners will be tempted to make up any loss of volume by turning the volume control instead of re-tuning the set.

"Please tell them not to do this horrid thing. If they don't re-tune, however little it may be, they are bound to get a backwash from a foreign station." Well, I have told you—so *don't blame me*.

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Old Station, New Site

SORRY, but I must shatter any fond hopes Midland Regional listeners may be entertaining about their new 50-kilowatt transmitter at Droitwich.

It will not be a *new* station, after all. Just a redundant medium-wave National with its wavelength changed. It may be London, or North or West National.

No need for desolation. These stations are still right up to date, or will be when the engineers have re-erected them.

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Songs from the Shows

FOR his first programme in the new "Songs from the Shows" series, I gather from John Watt that he will deal with famous Adelphi shows.

He is trying to get W. H. Berry to take part. If he succeeds the show is certain to be a great success.

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Four Nervous Young Men

CAN you imagine what they were nervous about? Nothing less than an announcing audition at Broadcasting House. Truly a nerve-wracking experience.

Huddled in studio 3D, each had to speak from a copy of a three-years-old news bulletin. The "inquest" was held under the auspices of Colonel Dawnay and Mr. Lloyd James, with the Blattnerphone remorselessly recording every slip of the tongue.

Don't jump to the conclusion that fresh announcers are imminent at London. Mr. Marriott, the new arrival, is doing well, but the B.B.C. always likes to have a few tested and approved applicants up its capacious sleeve.

W. H. Berry

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B.B.C.'s Recording Plans

MORE and better Blattnerphone recording will be done at Broadcasting House. They have also decided to do more recording on the new treated-gelatine process. It is cheap and quick—no mean merits for broadcasting work.

Of course, the normal soft-wax recordings are still unbeatable for sheer quality, but they take time—and are somewhat expensive.

Special Recording Department

THAT the B.B.C. attaches a growing importance to its recording work is proved by the recent appointment of a senior engineer as Engineer-in-Charge Recording.

It is hoped to develop a band of semi-specialists for this recording work, which entails records of rehearsals and records for Empire broadcasting.

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At Maida Vale

IN spite of the fact that the new Maida Vale premises are a good ten minutes walk from the nearest tube station, the B.B.C. has taken them over for several years. Perhaps they will institute a private bus service to convey artists backwards and forwards from Broadcasting House?

Meanwhile, the notion I put forward last week about a vaudeville studio gathers favour. There is no hurry at the moment, though, with

This Week's "Specials"

Special Christmas Programme Feature Next Week

Eric Maschwitz

the St. George's Hall on lease until next Autumn.

Eric Hits Back

WE radio columnists were taken into Eric Maschwitz's confidence to-day. He had us all nice and snug in one of the listening rooms at Broadcasting House, where he very ably defended all he has done.

He told us he was not going to drop the "In Town To-night" series, and that the "First Time Here" series was being only temporarily suspended.

He has bright ideas to liven up the Saturday teatime hour. In the New Year we shall have a "Tea Mixture" series—with a star to sponsor the numbers while we rattle the teacups and slog into the cake.

For Studio Audiences

ERIC made out a very sound case for the studio audience, I thought. He pointed out that there was a difference only of degree, not of principle, between the studio audiences and those in St. George's Hall.

Whereas the studio audience consisted all too often of "forty frightened people," the more free-and-easy attitude of the audience in St. George's Hall lent just the right atmosphere to the broadcasts.

Starring Special Features

PERHAPS the most significant development of broadcast light entertainment foreshadowed by Eric Maschwitz is the emphasis on feature programmes instead of on individual stars.

For example, following up the undoubted success of the "Café Colette" feature, the New Year will herald in a Tyrolean Band, compèred by two personalities to be known as Hans and Franz, who will cross-talk in broken English

Hint from America

IN thus placing the emphasis on the programme rather than on the artist, our B.B.C. Light Entertainment department is taking the hint from a very widespread practice in American broadcasting.

On the other hand, the Americans are learning a thing or two from us. Recently they have been taking broadcasts from the Carnegie and other halls, just to give listeners that "No. 10 Studio" effect we have striven so long to impart into our programmes. If that isn't a compliment, what is?

Are Studios Wasted?

MORE and more the tendency is for broadcasting to be done from halls instead of from studios. The other night, for instance, the Theatre Orchestra played its programme from St. George's Hall.

The effect at the loud-speaker was undoubtedly superior to any studio performance the orchestra has done to date.

It makes one wonder whether all that talk about exact reverberation periods in the Broadcasting House studios was not just a trifle over-done.

Radio Gossip of the Week

Rejecting Static

DO you appreciate the difficulty of testing a receiver in the neighbourhood of static interference such as is radiated from the electric signs of Piccadilly Circus? If you do, then you will be surprised to know that at the Radio Centre in Haymarket a radio receiver on test can reproduce programme signals without a trace of static interference. The manager has installed a Rejectostatic unit. He claims that good reception is possible on any make of set.

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Strasbourg Off the Air

IN anticipation of any mystified knob-twiddlers who, on tuning their sets between December 13-16, fail to pick up Radio Strasbourg, may we inform them that the station will be off the air from G.M.T. 13.15 on the former, until 16.00 on the latter date, to permit the engineers to make essential alterations to the plant? On December 17 you should note an improvement in signals.

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Early Ether Birds

FROM the queries we receive each week, we take it that many enthusiasts must stay up all night to pick up North and South American transmissions, and we wonder whether towards 5 a.m. they think of turning to some of the European transmitters. If they do, they will hear Prague's famous cock-crow, which is now being imitated and even embellished by the new opening signal put out by the Latvian stations to awaken the sleepy heads and drag them out of bed for the daily physical jerks.

Tune in to Madona or Riga and enjoy the short farmyard "song scena" which acts as a prelude to the early morning gymnastic course. Whether it is an effective alarm or not we cannot say, but at least it is a novelty for the town dweller.

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Percy W. Harris

For Constructors

PERCY W. HARRIS has always been a friend of the amateur constructor. This week he proves how closely in touch he is with constructors' needs by his article in our centre pages.

He goes right into the heart of things, passing on tips that he has learned himself in the hard school of experience. You, too, can benefit from these tips—and thereby improve your wireless reception.

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Century Super 1934

ALTHOUGH too early yet to give readers' comments on our 1934 Century Super indications strongly point to its enthusiastic reception by a large number of amateurs.

The new version has the great merit of using up nearly all the old parts, involving the constructor in the minimum of extra expense to bring the original model right up to date.

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Self-adjusting Volume Control

OUR self-appointed task of cleaning up wireless nomenclature started with the system known for short as "A.V.C." or automatic volume control. We prefer to call it self-adjusting volume control, and so, apparently, do many of our readers.

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Ready for Christmas?

In a wireless sense, we mean? You *must* have a good set if you are to make the most of all the fine programmes being prepared by the B.B.C. Why not build a new "A.W." set? There's still time!

From the B.B.C. Year Book . . .

YOUR licence costs you ten shillings a year. How much of it goes into broadcasting? The B.B.C.'s Year Book for 1934 reveals this and other mysteries. In 1932 the total amount left for the B.B.C. after Post Office and Treasury percentages had been deducted was 4s. 7d. per licence. Added to this amount was 1s. 3d. per licence for publication profits.

You will be interested to know that of the gross revenue of 5s. 10d. per licence no less than 2s. 6½d. was spent on programmes—half the total revenue.

Lest you should think that the "higher-ups" of broadcasting are overpaid, note that governors' fees amounted to only ¼d. per licence.

* * *

In the basement of Broadcasting House there is a restaurant. Contrary to rumours, the building is not licensed for the sale of alcoholic beverages, but this does not affect the patronage of the restaurant.

* * *

The S.O.S. service has taken a definite place in the social life of the community. It is not always effective, but the number of successes is quite high. A year's total S.O.S.'s of 542 for illness produced 304 successful answers.

* * *

In September, 1933, the Recorded Programme Library comprised 25,000 records. These had been accumulated, carded, and filed within six months. Two copies of each record are kept, one for rehearsal and one for transmission.

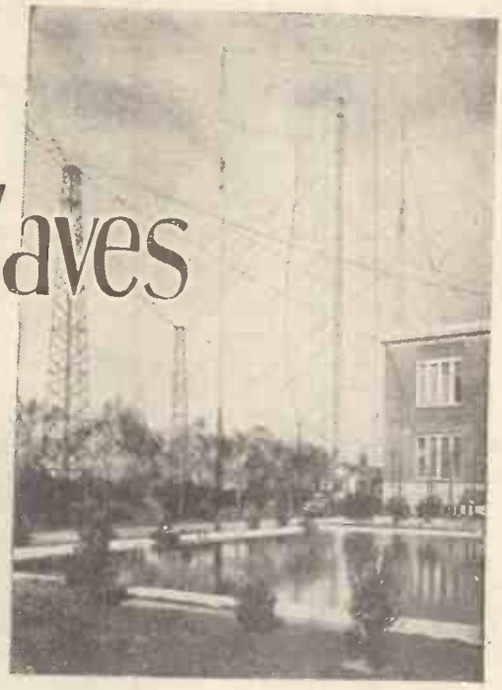
* * *

Eventually the B.B.C. hopes its Empire broadcasting will enable programmes to be exchanged between the British Isles and the Dominions and Colonies overseas. Australia may send us an Empire programme in 1934.

Betty Joel, the only woman radio designer, with the KB666 receiver, for which she designed the cabinet

J. GODCHAUX ABRAHAMS Tells You—

When to Listen on the Short Waves



A fine group of aerials at the Monte Grande (Buenos Aires) commercial station, well-known for its short-wave activities

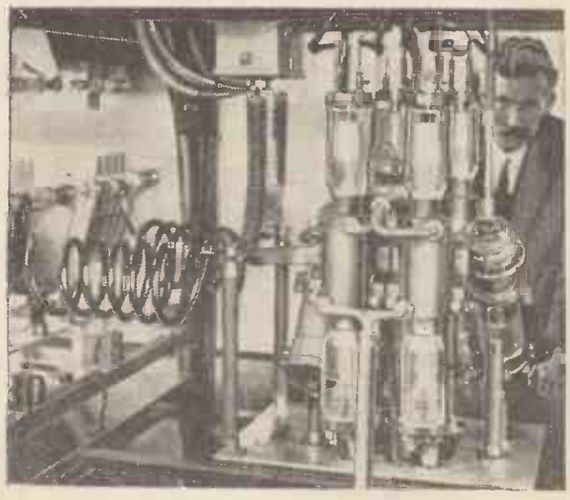
CONDITIONS during the past few weeks have been somewhat mixed inasmuch as although certain nights have proved exceptionally favourable for the reception of short waves from distant transmitters, on others any attempt to pick up broadcasts, even from some of the nearer and more powerful stations, has brought much disappointment.

Apparently we have struck another period of "sun spots," which, according to previous observations, have a very adverse effect on wireless transmission in general, and on the higher frequencies in particular. However, as these conditions are not of a lasting character, but change from day to day, the unfavourable results on one evening should not deter the experimenter from making another attempt on the following day or night.

New Transmission Schedules

As we have now reached the "short day" period of the year, most broadcasting stations have now advertised their new schedules and it will be useful to make a note of them as but few changes are likely to be made until the Spring. Some alterations have been made in the "timings" of the European stations.

Poste Colonial (Paris Pontoise) is now on the air on 19.68 metres from G.M.T. 13.00-16.00; on 25.20 metres from 16.15-19.15, and again from 20.00-23.00. For the later transmissions, namely from 23.15-02.00 and from 03.00-05.00,



A close-up view of the 60-kilowatt valves used for the Canadian service at Rugby

the 25.60-metre channel is used. As it frequently happens that the Poste Colonial takes from the Ecole Superieure (P.T.T.) studio any relays of operatic performances or events of national or international interest, it is good to know that when these occur between 20.00 and 23.00 G.M.T. they are simultaneously broadcast on 25.20 and 25.60 metres.

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With the bringing into operation of the new Budapest-Csepel 150-kilowatt transmitter, the Hungarian authorities have decided to give a short-wave relay of the programmes for the benefit of their nationals overseas. The broadcasts will be carried out by HAT, Szekesfehervar, which is testing at present on 43.86 metres (night) and on 21.92 metres (day).

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Reports have been notified of reception in the United Kingdom of HJ4ABB, Radio Manizales, Columbia, on 42 metres. Two transmissions appear to be made weekly which, translated into G.M.T., represent 01.00-03.00. (Thursdays), 04.00-05.00 and 20.00-22.00 (Sundays). Announcements are made in both Spanish and English, the opening and interval signal consisting of a gramophone record ("Just a Giglo").

Another South American station which has now cropped up is HC2RL, of Guayaquil, Ecuador, on 45.42 metres (6,605 kilocycles). It has been picked up on Thursdays between G.M.T. 03.00-04.00.

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Should you hear a Spanish transmission on a wavelength slightly above that of HVJ, Vatican (50.26 metres), you may log it as HJ2BA, Tunja (Columbia), of which the call incorporates the slogan: *La Voz del Pais*. The frequency is 5,952 kilocycles (50.4 metres). Broadcasts are irregular, but have been heard between midnight and 03.00 G.M.T. Be careful, however, that you do not mistake this station for EAJ25, Radio Club of Barcelona, which is now regularly working on Saturdays between G.M.T. 20.30 and 21.30.

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Of the Mexican broadcasters the "star" to-day is XETE, operated by the Ericsson Telephone Company at Mexico City, on 31.23 metres (9,600 kilocycles) between 19.30 and 22.00, and again from 23.30-00.00 G.M.T. Here we have a woman announcer giving out details of the programmes in both Spanish and English.

There appears to be no interval signal, but the station closes down with the playing of one of Rudolf Friml's most popular songs, "*L'Amour, Toujours l'Amour.*" Although this short-waver mostly gives its own programme, occasionally it carries out a relay from the studio of XETR, also at Mexico City.

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Mention has frequently been made of YV1BC, Caracas, but less is heard of its competitor YV3BC, Las Barrancas, near the same city and which also broadcasts nightly on 31.55 metres (9,510 kilocycles). You might, however, make a note of the fact that this station transmits a special wireless entertainment on the eleventh of each month, specially destined to listeners in the U.S.A. The time is G.M.T. 02.30-05.00.

This transmitter has also been heard experimenting on 49.34 metres (6,080 kilocycles) and on 48.91 metres (6,134 kilocycles), The call usually incorporates the words: "Radio Difusoria Venezolana."

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Slight alterations have again been made in the schedules of some North American stations. W8XAL, Cincinnati, now in possession of its new 10-kilowatt transmitter, works on 49.5 metres (6,060 kilocycles) in three "bursts," namely, from 11.00-15.30; 18.30-20-30 and 23.00-06.30 G.M.T.

W2XE, Wayne (N.J.) which broadcasts the Columbia programmes of the WABC, New York, studio, continues to operate on three different frequencies: 15,270 kilocycles (19.646 metres); 11,830 kilocycles (25.36 metres); and 6.120 kilocycles (49.02 metres), for which the times are respectively G.M.T. 16.00-19.00; 20.00-22.00 and 23.00-03.00 daily.

Another short-waver of the Columbia system, W3XAU, which relays WCAU, Philadelphia, works alternately on two channels 9,590 kilocycles (31.28 metres) daily from G.M.T. 16.00-22.00 and on 6,060 kilocycles (49.5 metres) from 01.00-05.00.

Popular Canadian Station

Of the Canadians, VE9JR, relaying CJRX Winnipeg, is one of the most popular. A search for this station is facilitated by the fact that it is on the air from 14.30-03.00 daily, except Saturdays and Sundays. The actual times are G.M.T. 14.30-15.30; 16.00-16.35; 19.00-19.15; 20.15-20.35 and from midnight to 03.00. On Saturdays, in addition to the first two broadcasts, it operates between 17.45-18.15 and from midnight to 03.30 (Sunday morning); the Sunday transmission would be heard in the British Isles between G.M.T. 02.00-03.00.

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Finally, if distance is no object, you might try for JIAA, Tokyo on 30.40 metres (9,862 kilocycles); it would be picked up between G.M.T. 09.30-12.40. The 38.07- and 19.36-metre channels usually given for this station are used for commercial purposes *only*. It would be worth while trying for this broadcast of Japanese entertainments direct; on a recent occasion they were relayed by Zeesen and fed to all the German transmitters.

Building the 1934 Century Super

By The Experimenters

The completed 1934 Century Super, which takes advantage of the latest super-het technique

This week "The Experimenters" continue their instructions for building the 1934 Century Super, preliminary details of which appeared last week

LAST week we tried, in a simple way, to tell you what we thought of the 1934 Century Super—what it can do, *why* it can do it, and why you simply must make it. Whether you already have a super-het of some kind or you are going in for your first home-built set is immaterial.

If you are already using a super-het more than a few months old, it is almost certain to be obsolete after January 15, when the Lucerne Plan comes into action. Have you realised that the wavelength of London Regional will be 342 metres? Where is the most congested part of the waveband on your own set? It is almost bound to be between 340 and 350 metres. But things won't be so bad as they seem if your set is capable of dealing with the changing conditions.

Superlative Claims

Most of you will think twice about scrapping £10 or £12 worth of perfectly good components to build a new set—even if you can find one to build that you know will do the job. So many sets for the home constructor are claimed to give amazing selectivity and superlative quality that one is rather inclined to become sceptical and to overlook a really good set that lives up to any moderate claims made for it.

Being experimenters by nature, we have gone into the job of redesigning the Century from the set-builder's point of view. We are making a lot of claims, but we are going to back them up by giving definite figures from which you will be able to judge the performance for yourselves. You see, we are not "sprucing"—we want to make you believe what we *know*—the 1934 Century Super will be the set of the year.

There are one or two little points that we want to explain before we tell you how to build the set. We can visualise so many of our readers taking up their copy of "A.W." and criticising the illustrations of the new set.

From experience we know that from nearly half of them the first words will be: "Another chassis set, why can't they use plain baseboards?" Why aren't chassis more popular? They are easier to handle than a baseboard—after you have got over the initial prejudice. All manufacturers use chassis—so does the knowing amateur if he wants his set to have that professional look about it.

The worst job with a chassis is the cutting of the holes for the valve holders, but this is because many of you don't go the right way about it. Some, or rather most, of you may not be blessed with too many small tools suitable for radio, but nearly everyone will have a brace and bit in the old tool chest.

Mark out all the holes on the chassis where the valve holders should go and churn these out with a 1-inch bit. You will find that the holes can be made very cleanly without any trouble. Use a fretsaw if you like, but *we* couldn't cut round holes this way.

Fix the valve holders first; this will give you a guide to the position of the other components. Leave the variable condensers and the band-pass coil unit until last, otherwise the chassis won't lay on flat when you are trying to screw on underneath the fixed condensers and whatnots. Scratch a line across the centre of the chassis; you will then be able to get the correct positions more easily.

Firstly, fix the brackets that hold the oscillator coil, volume control, and push-pull switch. The oscillator coil must be in the middle, otherwise it will upset other components, but the other two brackets are not so important. Just arrange them on either side to look neat and tidy.

Then screw down the fixed condensers; there are eleven of them. This may sound a lot, but you can get at them without taking the skin off your knuckles.

Now about the whistle filters. There are two types you can use, the variable Kinva in the anode circuit of the L2DD or the Bulgin type LF26 in the loud-speaker circuit. If you have made any alterations to the layout you will most probably have to use the Bulgin owing to lack of space. How this filter is fitted can be seen on the next page.

Using a Whistle Filter

To go off the rails for a moment, any old set that suffers from whistles can be improved out of all recognition by using a whistle filter in the loud-speaker circuit. This Bulgin filter, by the way, is about the only type that can be added without taking the set out of its cabinet to make alterations.

Be careful how you fix the valve holders to carry the intermediate-frequency coils; this may sound Irish, but we do mean valve holders. If these holders are too low the coil cans will touch the bottom of the cabinet, and if too high, the cans will touch the valve pins, with dire results. Obtain the correct positions with the coils in the holders, and mark with a sharp edge.

That's about all for the underside of the chassis. The low-frequency transformer will almost fit itself; just see that the H.T. and P terminals face the back of the chassis, then fix with woodscrews.

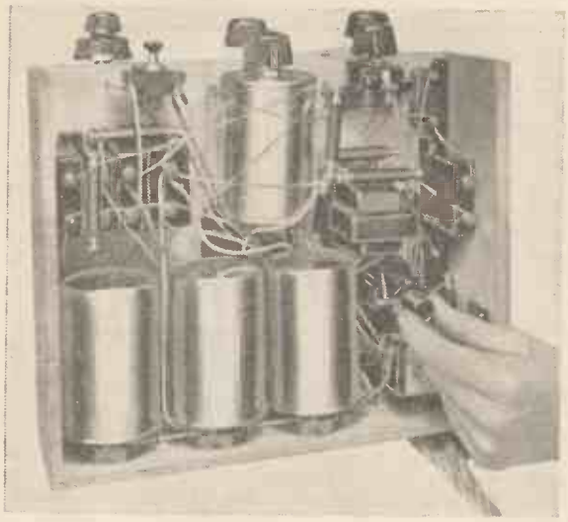
How the pigtail on an old coil can be strapped to the side of the can out of the way

All the fixed resistances are held in place by the wiring, so that there is no need to worry about these. We chose Ohmites because they are supplied with terminals—and you don't like soldering, do you?

Actually, this set can be built on the dining-room table—if the rest of the family will let you. There are no awkward jobs to do.

Now turn the chassis over. It is quite bare on top except for the six valve holders. The Wearite band-pass unit should be screwed down exactly in the middle, over the top of the line we told you to scratch. Screw it down about ¼ in. from the front, otherwise when you get the set in the cabinet the knob will stick out through the front about ½ in. It doesn't look at all nice that way.

Fix the double-gang condenser on the left-hand side of the coil unit and the single condenser on the right-hand side. The exact



Note the compact arrangement of the parts on the underside of the chassis

positions are not important, but we suggest you line up the knobs with those of the push-pull switch and volume control.

Except for a few oddments, that completes the fixing of the components. The first oddment is the drilling of the holes for the metal-covered wire. Drill these holes from the top *down through* the chassis. We emphasise this point because we tried to drill them from the underneath and almost went through the valve holders.

Then drill two holes down the left-hand side of the two-gang condenser and one on the left-hand side of the single condenser. That's everything. The 1.5-volt grid-bias battery is fixed after all the wiring has been completed.

Like most people, we are a trifle lazy, so we always start on the easy wires first, although it's the wrong way about.

Follow the Layout

We started off by wiring up the band-pass coil, but the safest way is to follow the layout guide and go by numbers, so you won't miss any wires.

By the way, the Editor has arranged to supply a full-size blueprint of the set for 1s. 6d., post paid. Just send your application to AMATEUR WIRELESS Blueprint Dept., 58-61 Fetter Lane, E.C.4, and mention No. A.W.413.

A vital point is to earth the metal-covered wires which go through the chassis. If these wires are badly earthed they will cause crackles and perhaps a noisy background. See that the wires holding the Ohmites are as short as possible and quite taut otherwise the resistances might take a short walk and probably come into contact with something they shouldn't.

When you have put on the last wire and checked up with the blueprint, connect up the six- and four-way cables. You can please yourself how you use the various colours; you can make your own colour scheme.

On the four-way cable fix two wander plugs, marked H.T.+ and H.T.—. Follow the colours through aud connect H.T.— to one side of the switch, and H.T.+ to the 2-microfarad fixed condenser. The two remaining cables are for the loud-speaker. Connect one to the anode of the Pen220A and the other to the 2-microfarad condenser. There is a'ready the H.T.+ tapping on this condenser; so fix both of the connections very tightly, otherwise they may come off.

The six-way cable is not so easily disposed of; that's why we left it till last—laziness coming out again. First join up two cables to two spade terminals marked L.T.+ and L.T.—. Take the L.T.— wire to the push-pull switch (it doesn't matter which point you use) and the L.T.+ wire to the filament leg of the oscillator valve holder. That leaves two spare points on the switch. Join one to the common side of the four fixed condensers—they are all lined up like soldiers—the last point being reserved for G.B.+.

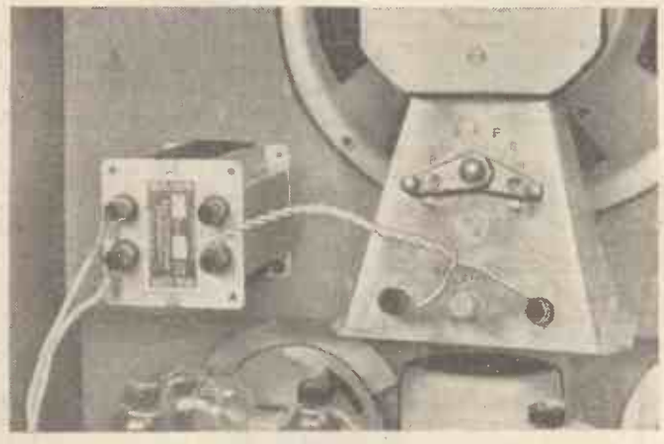
That leaves you with G.B.—, G.B.—1, and G.B.—2. G.B.— goes to one side of a 1-microfarad fixed condenser. G.B.—1 is for the L2DD, and is connected to a grid leak, you can see it on the left, by the side of the whistle filter. G.B.—2 is easy; take it straight to the G.B.— terminal on the low-frequency transformer. Then fix the 1.5-volt bias battery and take two connections to the fixed condenser and the Ohmite, and the whole set is completed.

Now for the big moment—testing. You will want a high-tension battery of 120 volts (capable of giving about 20 milliamperes), a 16-volt grid-bias battery, and a 2-volt accumulator—the bigger the better. Unlike the original Century Super the voltages are distributed internally by means of resistances, so plug the two high-tension tappings into the negative and 120-volt sockets.

Join up the accumulator and then think about the grid-bias battery. G.B.— goes into the 1.5-volt socket; this is for the oscillator valve. Plug G.B.—1 into the 3-volt socket to apply bias to the triode section of the L2DD and finally apply 10.5 volts to G.B.—2 for the Pen220A.

By the way, don't get worried about the Mazda L2DD. It is only a normal low-frequency amplifying valve with two diode anodes in the same bulb. The idea is for one diode to act as a detector; the second is to provide the self-adjusting volume control voltage and the triode to boost the output from the detector diode. That's how we use the three-in-one valve.

When the intermediate-frequency coils are plugged in, make sure that they are a tight fit. To make quite sure, open the pins a little.



How the Bulgin whistle filter can be screwed to the cabinet alongside the loud-speaker

Some thousands of volt-milliammeters are sold every year, so it is not too much to assume that many of you will have some means of testing high-tension voltage and anode currents. If the set has been wired according to the blueprint and your high-tension supply is up to scratch you should be able to obtain approximately the following readings :—

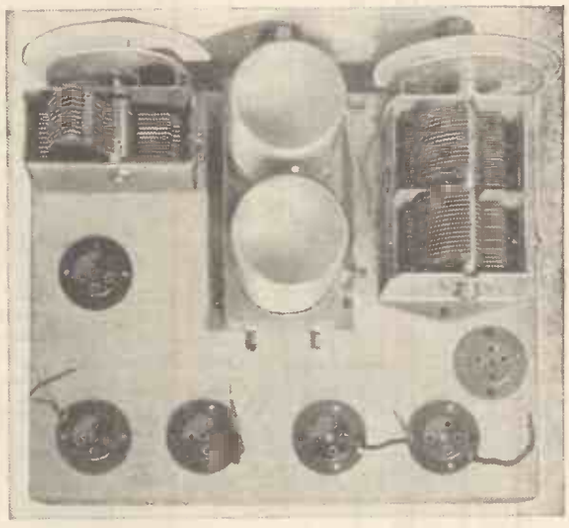
Between the chassis and the anode of the oscillator valve, 115 volts. If you don't get this voltage, see that you have the right resistance in the anode of the oscillator valve; it should be 15,000 ohms. Go through the whole set and just check the anode voltages without any valves in circuit.

Making Sure of Connections

This will let you know whether or not your multi-way cables have been wired up correctly and that the fixed resistances are all in the right positions. The anodes of the first detector valve and those of the two intermediate-frequency valves are at the tops of the bulbs, so between this point and the chassis you should get a reading of 120 volts. The same applies to the anode of the Pen220A and to the auxiliary grid.

Don't forget to check the screen voltage of the two intermediate-frequency valves. This should be about 75 or 80 volts.

It should be safe to insert the six valves at this point. The oscillator comes just behind the two-gang condenser on the left-hand side—it is a Mullard PM2DX. Just behind this is the first detector, a Mullard PM12A. In the centre of the chassis are the two intermediate-

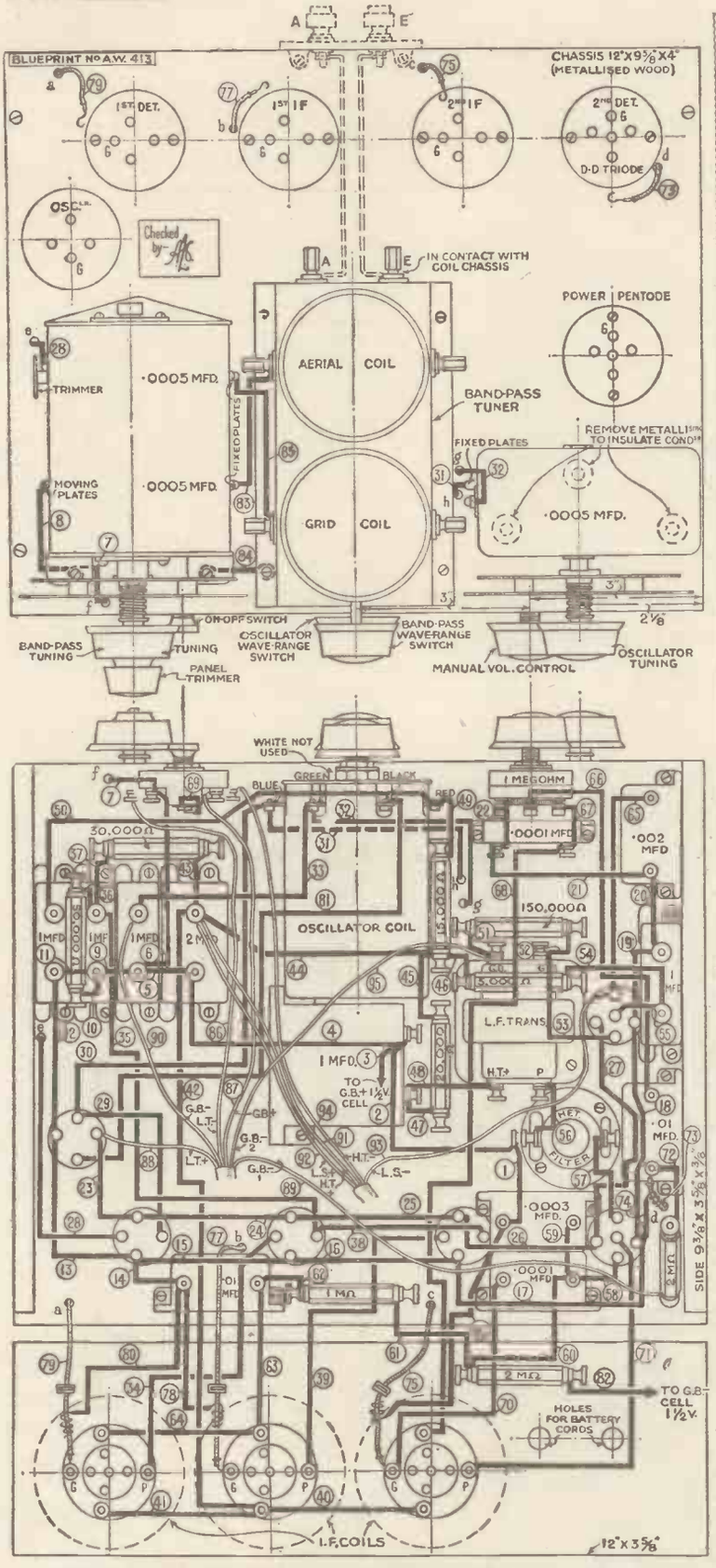


The layout of the top of the chassis is particularly neat and clean as this plan view proves

frequency valves, both Cossor 220VS's. On the extreme right is the high-light of the set, the Mazda L2DD. The final valve is a Mazda Pen220A. All the valves, with the exception of the pentode, are metallised.

It is hardly worth-while saying much about operating, but in case of accidents, here are just a few hints. Pull out the main switch which connects up the low-tension, high-tension, and grid-bias batteries, and you will hear a gentle rustle in the loud-speaker. Tune the set in the usual way, but a little more slowly, for remember that the selectivity is in the order of 9 kilocycles.

In actual practice, this means that two stations which have a minimum separation of 9 kilocycles can be heard without mutual interference. To give an example, the London Regional station uses a



This layout and wiring guide is reproduced at one-third scale. If desired a full-size blueprint can be obtained for 1s. 6d., post paid. Application should be made to "Amateur Wireless" 58/61 Fetter Lane, London, E.C.4.

frequency of 843 kilocycles, while Graz uses 852, a difference of 9 kilocycles.

There should be no need for you to write to us to find out whether this set will be sufficiently selective for your aunt or any of your other relatives to cut out, say, Daventry, at ten miles, for you may rest assured that the Century Super will eliminate the local station in a degree or so, within a matter of a mile or two.

HERE IS A LIST OF THE COMPONENTS NEEDED for "THE EXPERIMENTERS" 1934 CENTURY SUPER

CHASSIS
*1—Peto-Scott Metaplex, 12 in. by 9¾ in. by 4 in.

COILS
*1—Wearite band-pass unit, type G.N.2.
1—Wearite oscillator, type O2.

CONDENSERS, FIXED
*2—Graham Farish .0001-microfarad (or Lissen, Telsen).
1—Graham Farish .0002-microfarad (or Lissen, Telsen).
*1—Graham Farish .002-microfarad (or Lissen, Telsen).
*2—Graham Farish .01-microfarad (or Lissen, Telsen).
5—T.C.C. 1-microfarad (or Graham Farish, Lissen).
*1—T.C.C. 2-microfarad (or Graham Farish, Lissen).

CONDENSERS, VARIABLE
*1—J.B. .0005-microfarad, type Nugang A1.
*1—British Radiophone two-gang, .0005-microfarad, type 458A.

HOLDERS, VALVE
*4—Clix four-pin, chassis mounting.
*2—Clix five-pin, chassis mounting.
3—W.B. four-pin, type Midget, (or Graham Farish).

PLUGS, TERMINALS, ETC.
6—Belling-Lee wander plugs, marked G.B.—1, G.B.—2, G.B.—3, G.B.+, H.T.—, H.T.+ (or Clix, Eelex).
2—Belling-Lee spade terminals, marked L.T.—, L.T.+ (or Clix, Eelex).

RESISTANCES, FIXED
*1—Graham Farish 5,000-ohm, type Ohmite (or Lissen, Telsen).
1—Graham Farish 15,000-ohm, type Ohmite (or Lissen, Telsen).
1—Graham Farish 20,000-ohm, type Ohmite (or Lissen, Telsen).
*1—Graham Farish 30,000-ohm, type Ohmite (or Lissen, Telsen).
*1—Graham Farish 50,000-ohm, type Ohmite (or Lissen, Telsen).
*1—Graham Farish 150,000-ohm, type Ohmite (or Lissen, Telsen).
*1—Graham Farish 1-megohm, type Ohmite (or Lissen, Telsen).
*2—Graham Farish 2-megohm, type Ohmite (or Lissen, Telsen).

RESISTANCE, VARIABLE
*1—Igranic 1-megohm, type Megostat.

SUNDRIES
*3—British Radiogram 2-in. metal mounting brackets.
*1—Bulgin four-way battery cord.
*1—Bulgin six-way battery cord.
*1—Siemens 1.5-volt cell.
*Connecting wire and sleeving (Lewcos).
*3 ft. screened sleeving (Lewcos).
*1—J.B. escutcheon.

SWITCH
*1—Telsen four-point, type W153.

TRANSFORMERS, INTERMEDIATE-FREQUENCY
3—Wearite, type OT1.

TRANSFORMER, LOW-FREQUENCY
1—Lissen, type Hypernik (or Graham Farish, Telsen Ace).

WHISTLE FILTER
*1—Kinva, type B (or Bulgin, type LF26).

ACCESSORIES

BATTERIES
2—Lissen 60-volt high-tension, type super power LN2005 (or Drydex, Ever Ready).
1—Lissen 16-volt grid-bias (or Drydex, Ever Ready).
1—Lissen 2-volt 40-ampere-hour accumulator (or Fuller, Ever-Ready).

EARTH
1—Filt earth connector.

LOUD-SPEAKER
1—Blue Spot 45 P.M. (or W.B. type PM4A, Igranic, Rola with pentode transformer).

** Asterisks indicate parts needed for the new set which were not used in the original Century Super*

SUITABLE VALVES

Make	Oscillator	1st Detector	Intermediate-Frequency (2)	2nd Detector	Power
Mullard	PM2DX†	PM12A†	PM12M	—	PM22
Cossor	210Det	215SG	220VS†	—	220PT
Mazda	L2	215SG	S215VM	L2DD†	Pen220A†
Osram	L21	S23	VS24	—	PT2
Marconi	L21	S23	VS24	—	PT2
Hivac	D210	SG210	VS210	—	Z220
Lissen	—	SG215	SG2V	—	PT240
Tungsram	L210	S210	—	—	PP230

†Valves used in "A.W." tests. All metallised except power.

When you tune in a weak station you will notice a slight time lag of a fraction of a second. This is the self-adjusting volume control getting going.

Another point is the band-pass coil. This is of the latest type, and it causes the dial readings to be a shade out as compared with the oscillator. This is due to our retaining the old oscillator coil. We didn't think that it was worth another 18s. 6d., just to make these dial readings agree, but if you disagree with us you can change the coil if you like.

Advantages of Self-adjusting Volume Control

We haven't said much about the self-adjusting volume control and what it means to *you*. Imagine listening to a Continental station; a good example is Fécamp. Every few moments or so you have to jump up from a comfortable armchair to adjust the volume because of fading—one moment the volume is almost blowing your head off, and the next moment it is practically inaudible. A little of this soons spoils the programme.

With the self-adjusting volume control you vary the volume by means of the manual control to an agreeable level, and leave it. All variations are taken up automatically. During an evening the self-adjusting volume control can increase the entertainment value of foreign stations by as much as 50 per cent.

Finally, the variable whistle filter. This is simplicity itself. In the filter is a round metal core. If you want to cut off some high-pitched whistles, push the core in as far as it will go.

That's all. You've got the whole Christmas holidays in front of you. Make a good job of the 1934 Century Super!

EFFICIENCY
UNIFORMITY
LONG LIFE

KINGS OF THE AIR

You can appreciably improve the performance of your All-Electric Receiver, especially if it is two or three years old, by fitting the correct types of Cossor Mains Valves. Due to their advanced design and their famous Mica Bridge Construction, Cossor Mains Valves possess remarkable efficiency, uniformity and long life. Your dealer will tell you the types you need to make your Set like new again.

FREE!

72 PAGE WIRELESS BOOK

From cover to cover this new Cossor 72-page Wireless Book is packed full of useful and interesting information — latest circuits — explanations of technical terms — list of broadcasting stations, etc. Send at once for free copy. Please use the coupon.

To A. C. COSSOR LTD., Melody Dept., Highbury Grove, London, N.5

Please send me free of charge, a copy of the Cossor 72-page Wireless Book.

Name .....

Address .....

B.V.33 A.W. 16/12/33 .....

COSSOR
A.C. and D.C. MAINS VALVES

COSSOR A.C. MAINS VALVES (4 Volt Indirectly Heated Cathodes)

Type	Purpose	Impedance	Amp. Factor	Mut. Con. m.a./v.	Price
*†M.S.G.-H.A.	Super H.F. Amp'n	500,000	1,000	2.0	17/6
*41 M.S.G.	Super H.F. Amp'n	400,000	1,000	2.5	17/6
*†M.S.G.-L.A.	Super H.F. Amp'n	200,000	750	3.75	17/6
†*M.V.S.G.	Variable Mu S.G.	200,000	—	2.5	17/6
**M.S./PEN.-A	H.F. Pentode	—	—	4.0	17/6
†*M.S./PEN.	H.F. Pentode	—	—	2.8	17/6
†*M.V.S./PEN.	Variable Mu H.F. Pentode	—	—	2.2	17/6
*41 M.D.G.	Bigrid	40,000	10	.25	19/-
**D.D./PEN.	A.V.C. (Detector and L.F. Amp.)	—	—	2.7	20/-
**D.D.T.	A.V.C. (do.)	17,000	41	2.4	15/6
41 M.R.C.	R.C.C. or Det.	19,500	50	2.6	14/-
*41 M.H.	Detector	18,000	72	4.0	13/6
41 M.H.F.	H.F. or Det.	14,500	41	2.8	14/-
*41 M.H.L.	Det. or H.F.	11,500	52	4.5	13/6
41 M.L.F.	Low Frequency	7,900	15	1.9	14/-
41 M.P.	Normal Power	2,500	18.7	7.5	14/-
41 M.X.P.	Extra Power	1,500	11.2	7.5	16/6
M.P./PEN.	Pen. Power Output	—	—	3.5	18/6
‡P.T. 41B	Pen. Power Output	—	—	2.25	22/6
‡P.T. 41	Pen. Power Output	—	—	3.0	18/6

COSSOR D.C. MAINS VALVES (16 Volt 0.25 amp. Indirectly Heated Cathodes)

Type	Purpose	Impedance	Amp. Factor	Mut. Con. m.a./v.	Price
†*D.V.S.G.	Variable Mu S.G.	—	—	2.5	17/6
*D.H.L.	Detector	13,000	58	4.5	13/6
D.P.	Power Output	2,800	17	6.0	15/-
D.P./PEN.	Power Pentode	—	—	3.5	18/6
*D.S./PEN.	H.F. Pentode	—	—	3.0	17/6
*D.V.S./PEN.	Variable-Mu H.F. Pentode	—	—	3.0	17/6
**D.D.T.16	Double Diode Triode (A.V.C.)	16,000	40	2.5	15/6

*Supplied with Plain or Metallised Bulbs. **Stocked with Metallised Bulb only.
† Characteristics measured at -1.5 Grid Volts. ‡ Directly heated filaments.
Prices in this List do not apply in I.F.S.

♡ 4181

On Your Wavelength!

By Thermion

The Five-bob Battery

NOT long ago a correspondent told me of a wonder battery, a 120-volter, that he and others were buying for the sum of five shillings. He reported that his present one had been working a three-valve set—screen-grid, detector, and small power valve—for ten weeks at not less than seven hours a day and wasn't half done yet.

I hoped to go across to see what the real voltage of the battery was after ten weeks, but, unfortunately, my free times and his didn't fit in; so it couldn't be managed.

However, I found out from him where the battery could be obtained, and a couple of days before these notes were written I blued five bob on one, which is now undergoing a laboratory test. This test consists in running it for four hours a day through a fixed resistance that gives an initial load of 10 milliamperes. I will report week by week what its doings are.

What the Voltmeter Says

WHEN it arrived the five-bob battery showed an E.M.F., as taken with a high-resistance laboratory voltmeter, of 122.7 volts when under no load. Immediately it was placed under a load of 10 milliamperes this fell to 121.6 volts.

At the end of its first four-hour run the reading was 111.8 volts. A drop of all but 10 volts during its first four hours of service doesn't seem to point to a very long life.

Just before I began to write this morning it was brought into action once more. It had picked up somewhat during its twenty-hour rest, for the reading was 118.0 volts.

At the end of half an hour this had fallen to 112.2 volts and when its work for the day was done the voltmeter showed 109.0 volts. Remember that this is under the most favourable conditions possible; almost constant temperature and a full twenty hours' rest between working periods.

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Wireless Peace in France

FRANCE'S long-promised regulations against man-made interference have at last become law. But it is one thing to make wireless regulations and another — particularly in France—to enforce them. On paper the law is excellent, since at first sight it compels users of any apparatus whatever that is found capable of radiation to have it rendered innocuous.

There are, though, a good many exceptions, and once any law contains loopholes it is weakened from the very start. It is to be hoped that some good will come of this piece of legislation. Its results will be watched with great interest by the authorities in our own country, who are thinking of bringing in legislation on the same lines.

Don't ask me when this happy event will take place. At present matters are in the exploring - every - avenue - and - leaving - no - stone - unturned - in - order - to - find - a - formula stage.

New Wireless Word

MEANTIME, the French have coined an entirely new wireless word, which will probably be borrowed by us in course of time. To render electrical apparatus non-radiating by means of suitable appliances is, when you come to think of it, a rather cumbrous expression, but it is about the best that we can do at the moment.

The French call it quite simply anti-parasiting, or deparasiting. Neat and effective, I think.

◆ ◆ ◆

Thrilling Broadcast

SELDOM have I listened to a more exciting broadcast than the running commentary on the Harvey-Petersen fight. It was extraordinarily well done, for the commentator never let his own excitement run away with him, as sometimes happens.

Through him we were able to follow the whole course of the fight in the most vivid way and to share the final thrill. Something, though, went wrong when the assistant commentator tried to make use of the microphone, for then such distortion occurred that his words were barely intelligible.

Probably the mike was wrongly placed, a matter which will doubtless receive attention on future occasions.

Who Took the Alternative?

IT was rather sad that the alternative to the big fight was one of those political talks. I felt quite sorry for the talker, for I couldn't help wondering just how many of the six million receiving sets in use were tuned to the wavelengths allotted to him.

I am afraid that the counter-attraction must have been too strong for him to have had much of an audience.

◆ ◆ ◆

Budapest Excels

BUDAPEST'S new 120-kilowatt transmitter is now in full operation and the station's programmes are magnificently received in this country. I was quite sure that they would be, for the old 18-kilowatt transmitter was pretty good after dark, and for some weeks prior to the opening of the new giant I had been listening to test transmissions, some on reduced and some on full power.

By the way, amongst the most attractive broadcast items from the Continent are the tzigane concerts which Budapest relays about three times a week. If you are not already familiar with them, you have a splendid chance now of discovering for yourself just how good they are.

◆ ◆ ◆

Idea for "The Experimenters"

IF "The Experimenters" want a new field for investigation, here's an idea for them. There is no doubt that our present standard intermediate frequencies in super-heterodynes of 110 and 126 kilocycles are not too satisfactory, for, unless rather elaborate filtering circuits are used, second-channel interference is apt to be a nuisance.

Henry Hall playing over a piece of music with the St. Dunstan's Dance Orchestra, which has been invited by the Prince of Wales to take part in a Christmas Party at York House

Can a better frequency be found? I think that quite possibly it can. The whole problem is to find a frequency so high that second channels, when they do occur, will fall outside the limits of the medium wave-band; yet it must not be high enough to spoil the performances of the set when operating on the long waves.

A frequency in the neighbourhood of 300 might be well worth investigating, and I know

Listen to These Broadcasters - - - - - By Slade

that one or two firms of manufacturers are ready to make up intermediate-frequency transformers tuned to any required frequency. What about it, "Experimenters"?

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Don't Worry About Wavelengths

ARTICLES which have appeared in certain of the lay papers may have dealt something of a blow to Christmas wireless sales by suggesting quite erroneously that sets bought or made now will be more or less out of date when the new wavelengths come into force on January 15.

I know quite a few people who thought of putting off purchases for a month or two until I explained the position to them. The new order of things will not make the slightest difference to present receiving sets, except that the station-name tuning dials will not give accurate indications. But, as they never do, I don't see that that matters very much.

Some firms are arranging to supply corrected dials at a nominal price, whilst others, as a temporary measure, are giving free to owners of their sets printed slips showing the approximate readings of stations under the new scheme. In any case, it will probably be midsummer before stations have settled down to their wavelengths, and the wise man will wait till then before changing his dial.

Station-list Suggestion

HERE'S an idea for a very simple method of dealing with the situation after January 15. Make a list in two columns, one headed "Stations" and the other "Tuning Position." In the first column write in the biggest and best European stations, or those that you normally receive, in their new wavelength order. In the second, show the position of the pointer needed to bring them in under the Lucerne Plan.

Thus the London Regional, which drops from 356 metres to 342.1 metres, would probably appear in column 2 as "Between Brussels No. 2 and Strasbourg." Similarly for Langenberg column 2 might show "Just below Beromünster," and for Heilsberg "Between the Scottish National and Hilversum."

A list of this kind won't take long to compile and, once you have made it, tuning will be simplicity itself. Further, you can always keep it up to date by making any necessary alterations from time to time.

◆ ◆ ◆

Radiograms at Christmas

AT Christmas time the radiogram can be pressed into service as a provider of all kinds of fun. A large variety of special records has been prepared for the purpose. One of these contains extracts from a score of classical airs and the game is to see who can correctly name the greatest number with their composers.

Identifying everyday noises is another good one and there is a really exciting race game on records. Forfeits and comic fortune-telling also figure, and if you have a taste for astrology there are predictions by a well-known expert.

By the way, if you want a really funny record there is an old one that I can strongly recommend, if you don't already know it. This is "Laughing Gas," and if it doesn't make *you* laugh—the second side, anyhow—I am prepared to eat it.

◆ ◆ ◆

Wireless Fan's Elbow!

IS mine the first case of radio's very own disease?

Many other trades, professions, and hobbies have ailments peculiar to themselves, but so far wireless has appeared to be innocent. Well, here's what happened to me. For years I have been in the habit when sitting at the controls of leaning hard on my left elbow. It began to be painful and eventually developed a kind of bunion which called for treatment by the family medicine man.

Just in case you would like to know, *he* called it an olecranon bursitis. To disarm criticism at the outset, let me state emphatically that it was caused by putting down the elbow, and *not* by lifting it.

◆ ◆ ◆

Tip for Terminals

IT is extraordinarily difficult, as you have probably found, to screw down the round milled nuts supplied with certain components so that they really *are* tight. Or perhaps I should say so that they remain tight. If you want your connections to stay put, as no doubt you do, here's a tip worth remembering.

Provide yourself with a dozen or two full-thickness hexagon nuts in both 4B.A. and 6B.A. sizes, scrap the round nuts, and use these instead for your connections. Turn them down with a box spanner and you needn't have any fear of their working loose.

It is really worth while to do this when you are building a set, for I suppose that more than half the faults that can plague the constructor are due to screwed-down connections that have come partially or completely unstuck.

◆ ◆ ◆

Adding Punch to Filaments

A FRIEND whose knowledge of wireless is, to say the least of it, sketchy, wrote for my advice on a little problem the other day. He didn't seem, he said, to be getting enough punch out of his set, so he proposed to add some by substituting a 4-volt accumulator for his present 2-volter.

Didn't I think it was a good idea? My reply was that the suggested punch would unquestionably be a knock-out blow, with five valves taking the count.

◆ ◆ ◆

Wireless Eliminators

NOWADAYS the term eliminator is usually applied to the gadget which supplies us with high tension from the mains, though whether it is the dry-cell battery which is supposed to be "eliminated"—or the hum from the mains—is a matter of some doubt.

In the early days I remember the same word was used to describe either a rejector circuit, or a couple of balanced crystals, or some similar arrangement for cutting-out atmospherics and other "parasitical" disturbances, and in this respect I think the name was well chosen.

◆ ◆ ◆

Kerr Cell's History

THE Kerr cell, though quite an up-to-date refinement in television, is based on a discovery which dates back to 1886, when it was found that a polarised ray of light could be "depolarised" by passing it through carbon bisulphide under the influence of an electric field. The stronger the field, the more illumination gets through, and vice versa, so that the arrangement acts as a very convenient form of light "control."

Actually the carbon bisulphide converts the plane-polarised light into an elliptically-polarised ray. As the applied signals get stronger, the ellipse becomes more nearly a circle, in which condition the maximum amount of light gets through on to the viewing screen. Another striking instance of a scientific "dug out" coming back to active service!

◆ ◆ ◆

Mystery of Valve Life

MOST people find that two pairs of boots used alternately will outlast two single pairs worn out in succession. I am not quite sure why this should be so, but apparently the same rule applies to valves.

A friend of mine assured me the other day that his set of valves had lasted for four years, and were still going strong. Of course I know very well that some valves put up a very good show—particularly the battery-driven variety which, as a rule, seem to enjoy greater longevity than those on the mains. All the same, one must expect a serious falling-off in performance after four years, and I was proceeding to advise him to replace them at once when he "spiked my guns" by explaining that he had invested in a "duplicate" set of valves from the beginning, and had changed them over regularly once a week ever since.

FOR the amateur to make his own radio gramophone with an automatic record changer does seem to be rather an ambitious project. The trouble appears to be not so much in the design, but in the cost of the automatic record-changing equipment.

We are pleased to record that a new automatic changer has been developed and finally marketed by Collaro, Ltd. This idea is very original as it overcomes many of the defects which at the moment appear to be inherent in other types of changer. The Collaro unit costs £6 17s. 6d. in chassis form or £8 17s. 6d. as a table model.

Collaro claim that to play gramophone records with their equipment is as easy as posting a letter and very similar in operation. The gramophone record is simply pushed through an opening in the front of the cabinet, the changer completing the job and rejecting the record after it has been played through.

The salient features of this invention are that it would convert any radio set into an automatic radiogram; it will play 9-in., 10-in., and 12-in. records mixed up in any order; the lid of the cabinet need never be opened for either record or needle changing; and there are no controls to operate.

At the moment, it is only available for A.C. mains.

New Automatic Record Changer

Programme Items for Your Entertainment

Enjoying radio at a pre-Christmas party with the Marconiphone 274 radiogram

Wednesday, December 13

NATIONAL.—Symphony concert relayed from Queen's Hall.

London Regional.—"On the House," a Radiovaria programme by Godfrey M. Hayes and F. Keston Clarke. The cast includes the Three Ginx.

Midland Regional.—Rushden Temperance Band conducted by Thomas Young; Eddie Robinson will entertain with Lancashire sketches. The Ross-on-Wye Orpheus Society concert.

West Regional.—"The Exile," a Welsh concert. Christmas music by the University of Bristol Madrigal Singers. Pianoforte solos by D. E. Pitcher.

North Regional.—Orchestral and choral.

Scottish Regional.—The Falkirk Octet Party, directed by John Trapp. The Falkirk Trades Band conducted by John Faulds.

Belfast.—Symphony concert relayed from London. The Mayfair Glee Singers in the afternoon.

International Relay on Christmas Eve

PURSUING its motto "Nation Shall Speak Peace Unto Nation," the B.B.C. has arranged a very interesting international broadcast for Christmas Eve.

Taking part in this special programme, which will be broadcast from the Nationals at 8 p.m., will be studios in New York and London, as well as the famous bells of Bethlehem and a service from Winchester Cathedral.

At present the exact make-up of the programme is being kept a secret, and the B.B.C. does not intent to enlighten listeners until Christmas Eve actually arrives. The element of surprise will certainly add to the interest of this broadcast.

Considerable technical skill will be needed to make the broadcast a real success. The various points in England, in America, and Jerusalem, will all be linked to the Control Room at Broadcasting House.

Thursday, December 14

National.—Recital of Albert Roussel's music.

London Regional.—*By Royal Appointment*, a revue. Producer, C. Denis Freeman; B.B.C. Theatre Orchestra and revue chorus, conducted by Mark H. Lubbock.

Midland Regional.—*Cards on the Table*, a one-act comedy by Vernon Sylvaine. Cheltenham Spa Octet directed by Arthur Cole. Part of Handel's *Messiah* by the Nottingham Philharmonic Society, with London Symphony Orchestra, conducted by Sir Hamilton Harty.

West Regional.—*Mid-summer Morning*, a one-act play by A. O. Roberts; action takes place on the summit of Snowden. Also *Y Mynydd* (*The Mountain*); all items of this programme will deal with the mountain.

North Regional.—A relay of variety from the Grand Theatre, Blackburn. *The Messiah*; first party by the Halifax Choral Society and the second party by the North Staffordshire district Choral Society.

Scottish Regional.—Vocal and instrumental recital.

Belfast.—Recital of music for harp, flute and violoncello.

Friday, December 15

National.—*The Path of Glory*, a war play in which both sides are determined to lose for economical reasons. Producer, Lance Sieveking.

London Regional.—Chamber concert (No. 5) from Concert Hall, Broadcasting House.

Midland Regional.—Midland Composers, Gustav Holst (No. 19).

West Regional.—Orchestral concert.

North Regional.—Microphone Tour No. 1.

Scottish Regional.—John MacArthur Quintet; Juliette McLean will take part. Peeblesshire Shepherds Annual Dinner—you can expect some good stories.

Saturday, December 16

National.—Special variety programme—Alexander and Mose, Sandy Rowan and Florence Oldham.

London Regional.—*The Path of Glory*.

Midland Regional.—A carol concert by the City of Birmingham Choir; Stuart Robertson, soloist.

West Regional.—*The Messiah*, parts 1 and 2, relayed from the Colston Hall, Bristol.

North Regional.—Light instrumental recital.

Scottish Regional.—Variety programme—Tommy Morgan, Denis Emons (light songs), Nora K. Mitchell (Scottish humour) and Tommy Yorke (comedian) are taking part.

Belfast.—*Between Two Stools*, an Ulster Comedy by J. H. McIlveen.

Sunday, December 17

National.—Choral programme by Wireless Singers. Viola recital by William Primrose.

London Regional.—Service from St. Andrew's Presbyterian Church, Eastbourne. Mozart pianoforte concerto by Myra Hess, in orchestral concert.

Midland Regional.—Midland composers, Basil Harwood (No. 20). Relay from the Church of the Messiah, Birmingham.

West Regional.—Carol Service from the Royal Naval College, Dartmouth. Choir entirely of cadets, officers and masters.

North Regional.—B.B.C. Orchestra, conductor Adrian Boult.

Belfast.—Oratorio, Mendelssohn's *Elijah* (Part II).

Monday, December 18

National.—*A Christmas Carol*, full-size presentation lasting over an hour. Seymour Hicks as Scrooge.

London Regional.—Police band concert.

Midland Regional.—*Daylight Robbery*, a burglaresque by the Melluish Brothers; producer, Martyn Webster.

Myra Hess

West Regional.—Last of the "Let's Do a Play" series. Scenery and lighting will be the topic.

North Regional.—Police band concert from London.

Scottish Regional.—Bonnybridge and District Prize Silver Band.

Belfast.—Orchestral concert.

Tuesday, December 19

National.—Chamber music.

London Regional.—*A Christmas Carol*.

Midland Regional.—A band concert.

West Regional.—Swansea Orpheus Choral and Orchestral Society's first concert of the season. *A Christmas Gambol*, by Richard Gwinnet, an eighteenth century comedy.

North Regional.—Pantomime rehearsal of Laidler's *Cinderella*; short relay from Theatre Royal, Leeds. Harold Bradbury, tenor.

Scottish Regional.—"Scotland To-day and To-morrow"; John Highton, who gave the first broadcast of the series, will sum up. The Heather Sextet and a short Handel recital by W. Watt Jupp.

Belfast.—Orchestral concert.

High Spots of Xmas Broadcasts

THIS year the B.B.C. is making special efforts to give listeners a really first-class series of Christmas radio broadcasts. No effort has been spared to provide suitable fare for the festive season.

Perhaps the biggest high spot of the Christmas broadcasts will be the pantomime of *Sindbad the Sailor*, an old-time affair with an excellent cast as announced last week. On the Nationals this panto will first take the air at 7.45 p.m.

In that night's appeal, Mr. Lloyd George will speak on behalf of that very deserving cause, the Wireless for the Blind fund.

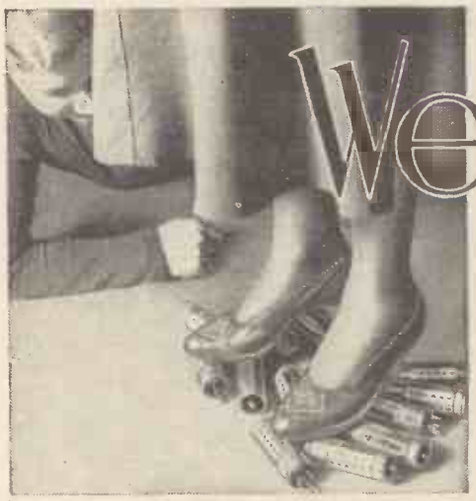
A programme of Gilbert and Sullivan will be another high spot of Christmas Day.

Henry Hall will conclude the Christmas Day broadcasting by supplying you with plenty of dance music—specially chosen so that you can dance to the strains of the loud-speaker.

On the Regional wavelength there will be "Hey Ho the Holly"—a goodly mixture of literature and music for the slightly higher-brows.

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

We Test for You



Demonstrating the strength of Catkin valves

NONFADE SECTIONAL HIGH-TENSION BATTERY

IN this new type of high-tension battery each cell is replaceable in the event of its developing a high internal resistance. The individual cells are quite normal in appearance, being contained in small zinc cans, and when assembled in a battery are insulated from each other.

The batteries are supplied unassembled, but the process of assembling and connecting up is

A 66-volt Nonfade high-tension battery

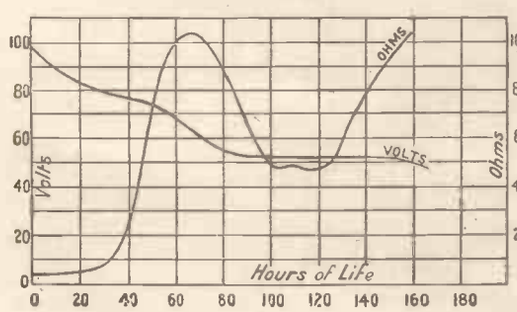
extremely simple and such that anyone can undertake it. The battery may be obtained in three sizes—66 volts, 108 volts, and 126 volts. The refill cells are available with different coloured filling compound, thus enabling the user to be quite certain which portion of the battery has been renewed at any time.

Test Results.—The battery tested was a 66-volt size, but the results have been plotted on the basis of 100 volts, as is our usual practice. The chart accompanying this report shows the variation of voltage and internal resistance over the working life of the battery. It will be seen that the voltage drops somewhat rapidly at first, but thereafter somewhat more slowly until the cut-off point, which occurs after about 160 hours of life.

The internal resistance is initially fairly low, but then rises very rapidly, dropping again till the cut-off point, where a very rapid rise occurs. The milliampere-hour capacity of the battery was approximately 1,200, which is just up to standard.

In order to facilitate testing for dud cells a small gadget is supplied which consists simply of a flash-lamp bulb fitted in a small holder.

Makers: Nonfade Battery Works. Price: 66 volts, 5s. 6d.; 100 volts, 7s. 6d.; 126 volts, 9s. 6d.



Performance curve of the Nonfade 66-volt battery

Test Methods Explained

High-tension Batteries

THERE are many methods of testing high-tension batteries, but for present purposes obviously the best is that which tests the battery under conditions which approximate to actual practice.

Of the two methods in general use, one puts a constant load on the battery and allows it to discharge continuously, while the other loads the battery for eight-hour periods with sixteen-hour rest periods between. The last method is the one employed for the tests published in these columns.

The method, then, is to select a portion of the battery under test, and having measured the voltage with no load, to connect across it a such known resistance that the current is 9 milliamperes in the case of the standard-capacity battery, and 18 and 27 milliamperes respectively for double and triple sizes.

The initial value of 9 milliamperes is chosen because the average discharge current over the life of the battery is then approximately 7 milliamperes, the rated current for single-capacity size. The same argument applies for the other sizes.

The internal resistance and load voltage of the battery are measured during each eight-hour discharge period, and the results reduced to the standard of a 100-volt battery are plotted in the form of a curve which shows at a glance the behaviour of the battery. The end of the useful life is assumed to have been reached when the voltage has dropped to 50, at which point it is found that the internal resistance has usually reached a value in the neighbourhood of 1,000 ohms.

BLUE SPOT CLASS-B ADAPTOR

THIS new Blue Spot adaptor has been designed especially for use with Blue Spot loud-speakers. It is built up on a metal chassis which provides space and fixing lugs for mounting any Blue Spot loud-speaker of fairly recent design.

On the chassis are mounted the driver transformer and the various terminals for grid-bias, accumulator and high-tension battery in addition to the seven-pin valve holder. There is also provided a tone-control switch and plug for use of an extension loud-speaker.

No output choke or transformer is provided as some of the Blue Spot loud-speakers are already arranged for class-B operation. In the event of a loud-speaker being used which is not so arranged, a special output choke is available for fitting to the chassis, the extra cost being quite small.

Blue Spot class-B adaptor unit

The circuit of the adaptor is suitable for all types of class-B valve, including those requiring a small amount of grid bias; in fact, the adaptor is quite universal and can be used in most circumstances.

Test Results.—The adaptor was tested under the maker's specified conditions with both biased and unbiased class-B valves and it was found to be generally satisfactory in use.

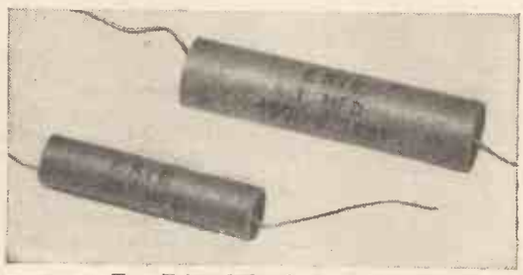
When an extension loud-speaker is used, care should be taken to ensure that the resultant load imposed by the two loud-speakers in parallel on the output valve is correct or distortion and lack of sensitivity may result.

Makers: British Blue Spot Co., Ltd. Price: £1 9s. 6d. and £1 17s. (including output choke).

ERIE TUBULAR CONDENSERS

THE new Erie tubular condensers are made up in small lengths of paxolin tube approximately 3/8 in. in length, which is about the same as the well-known Erie composition-type resistances. These condensers are available in almost any value, the smaller sizes having a diameter of 5/32 in. and the larger values slightly more. They are provided with approximately 1¾ in. of thin copper wire to enable them to be wired easily direct into circuit. They are all tested at 1,500 volts D.C.

Test Results.—The four samples tested were rated at .0002, .0003, .0005 and .01 microfarad. The measured capacities were found to be .00023, .00028, .00047 and .011 microfarad, which values are in fair agreement with those given by the makers. No sign of leakage was found when the condensers were tested on 500 volts



Two Erie tubular fixed condensers

Makers: Radio Resistor Co. Price:
.0001-.0006 microfarad 1s.;
.01 microfarad 1s. 3d.;
.02-.25 microfarad 1s. 6d.

Radio Christmas - 1999 A.D.

DEREK ENGLAND Peeps Into the Future

COME with me to this Christmas party (yes, we've been given a couple of invitations) and see how radio has changed social habits.

1999 A.D. !

It's late on Christmas Eve, and being dark you can't see the outline of our host's house clearly; but it strikes you as futurist, though not cubist, as was the "modern" style in 1933. By 1999 we have become thoroughly practical again, for cubes are *so* uncomfortable !

We are the first to arrive, so there's plenty of time to look round before the cocktails are handed out:

It still looks like Christmas, although it's 1999 !

Although the room is deserted, the lights are not switched off. You notice that there are no electric-light bulbs, for the light comes from rows of tubes built into the walls and ceiling, somewhat like the neon-gas advertising signs we used to know sixty-six years ago.

"I've just had this Raylite installed," explains the host, "as everybody else in the road has it, and my wife would insist."

He continues, and explains. The natural daylight comes from the incandescent gas in the tubes. The electricity is never switched off, for there is a photocell control by the windows which turns the light up brighter as daylight fades so that the room is always constantly brilliantly lit.

Radio must take a big place in the modern villa, and just as you're wondering where the set is, the proud houseowner continues :

"This Raylite gas, y'know, old man, is the stuff they discovered ten years ago for radio . . . you know, the stuff on which they project the pictures."

You don't know, of course, and a blank look conveys as much.

He turns to a dial and very slowly one end of the room glows a vivid white. The effect is electrical. You could not say that the light was on the wall, nor from which direction it was coming. It is simply that this part of the room is ten times as brilliantly lit as the daylight part.

Built into the wall is a little panel with a dial like an automatic telephone. He refers to a directory card for the number and dials it. Then the magic happens.

The brilliantly lit part of the room takes shape and parts become darker. Figures can be seen moving about in the brilliant glow, and within five seconds you can see that a man and a woman are doing a vaudeville act at the end of the room. If there were not a slight lack of solidity you would be quite sure that they *were* in the room, for the speech and music are absolutely natural; but although they are pictures standing out in stereoscopic relief, you can see that they are not quite the living thing.

"Surely," says our host, "you have seen this before? Why, it's almost as old as loudspeakers !"

Another blank look, which compels him to explain.

The Raylite gas fills one end of the room and the television pictures received by the radio set which we have not yet seen is projected on to the vapour which, although invisible, causes a life-size three-dimensional picture to be built up in natural colour.

There's nothing for it but to make a clean breast of matters. Sorry, we've been out of touch with radio for many years; too busy, and all that. Our host is condescendingly sympathetic, but the other guests are drifting in and Christmas, 1999, is near at hand. The party is beginning.

The life of the party is the radio. Our host dials number after number of the telephone-like wall panel. The vaudeville act fades out and for a moment everything is dark. A shot rings out and a torchlight (don't be scared, it isn't real !) breaks the darkness. A figure steals along a parapet which looks surprisingly real, although you know by now that it is only a gas glow.

No need to ask what it is. A radio thriller is being broadcast with a hundred per cent. thrill conveyed by the lifelike television.

The crook disappears and gives place on the gas screen to the curtain of a vast stage. Radio opera. A plump contralto paces to the edge of the stage just in front of your feet and sings an aria written two hundred years ago.

The contralto fades in favour of a German-looking announcer as a fresh number is dialled. Then come a costume play, some dancers, a comedian, more vaudeville. . . .

This amazing kaleidescope is too vivid to be real, but it is more concentrated entertainment than you ever saw on the stage or cinema years ago in 1933.

Our Christmas party is gay, but four hours of this radio tour of Europe is too much. Somebody gets up and dials "O." The vision vanishes. It's time for the kiddies to have their bonbons, and while this is going on we can buttonhole one of the Bright Young Things and get a few technical facts.

"You don't know about Raylite, International Broadcasting, microwaves, wired wireless. . . ."

That *does* strike a resonant chord. There was wired wireless even in 1933 and American experts in the Bell Telephone Laboratories had put out radio programmes on electric-light wires.

"Is that how broadcasting is done now?"

"Picture broadcasting, yes. When all the governments got together about ten years ago and formed an International Broadcasting Control, we thought it was high time that ordinary picture broadcasting for home programmes was taken off the ether. There were two million stations, programmes and commercial, all wanting wavelengths. As, by then, every house had electric light, the obvious thing was to impress the radio high-frequency waves on the electric-light wires."

"So real wireless is only used by Government stations, ships and . . ."

"Ships? My dear fellow, there aren't any ships these days big enough to have radio. The only boats of any size are the tenders which take out supplies to the floating aircraft platforms in the North Sea and in mid-Pacific and mid-Atlantic. All the air liners use wireless on about 250 kilocycles (that's about what you used to call 1,200 metres, in the old days when wireless was measured in wavelengths) and the International Government stations use microwaves only a few inches long. Their transmissions are secret, you see."

"What's happened to the B.B.C.?"

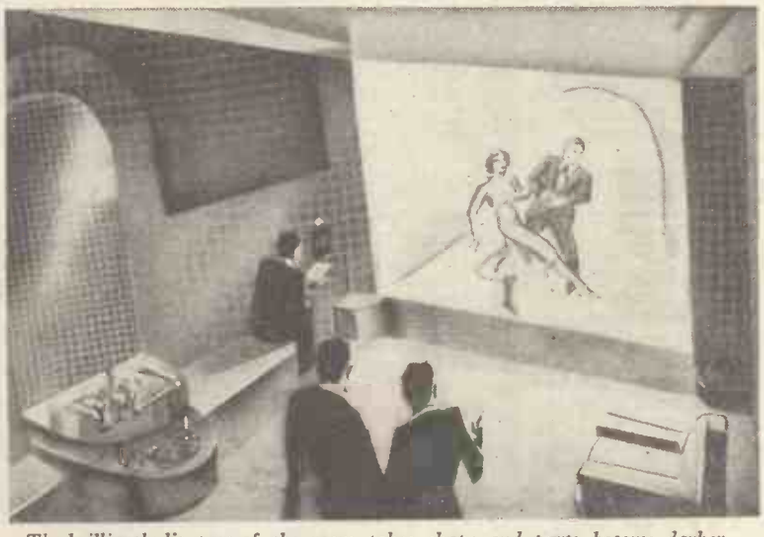
"Surely, my dear chap, you don't remember the old B.B.C. days? Why, it must be over twenty years ago that the American entertainment industry swamped this country and when there was such a war between broadcasting and the cinema kings that we gave up the idea of allowing any one company to broadcast. All the programmes you saw at the party to-night came from the International stations, some in this country, and some from European divisions—what you used to call France and Germany, before we did away with nationalism."

The glow came on again at the end of the room and out of nowhere came the sound of bells, pealing in Christmas Day, 1999. Our party was almost at an end, so we take one more look at the miraculous radio artists moving about in the gas glow. Just one more question.

"All this comes by radio on the electric-light wires?"

"Yes."

"And you still call it *wireless* !"



The brilliantly lit part of the room takes shape and parts become darker. Figures can be seen moving about in the brilliant glow . . . .

PERCY W. HARRIS Gives S

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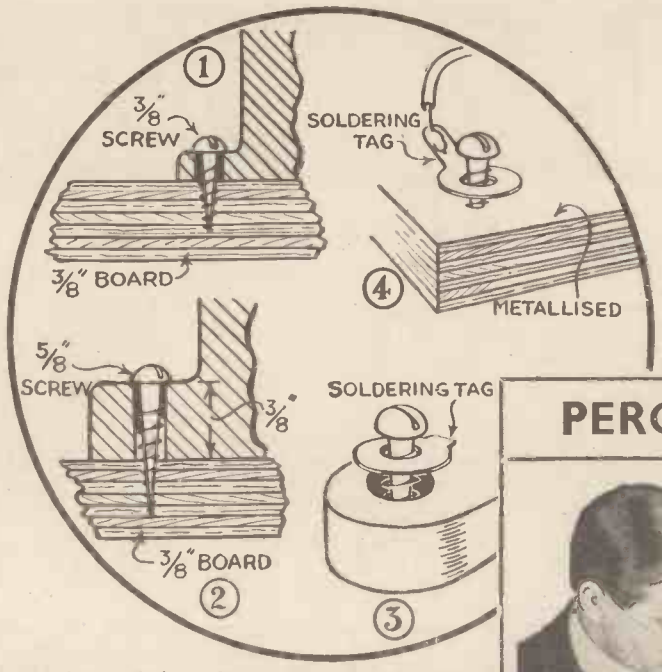
Short Cuts to Succ

IT is good for us set designers every now and again to spend a little time watching *other* people build sets! I say this in all seriousness because one has only to peruse some set-construction articles to realise that the writers thereof have very few points of contact with the average man.

A mere statement that this or that should be done is of little use if the task in question is beyond the ordinary man's ability, or the set is one requiring the use of tools which are not generally to hand.

Here are a few hints and tips about matters which I find from personal experience give difficulty in home construction. Very few, if any, of the hints are new, but I am giving them just because they appear to be little known. More commonly, it is assumed that the reader knows them, for which reason they have been left for a long period unexplained.



BASEBOARD-ASSEMBLED COMPONENTS

Baseboards nowadays are practically standardised in seven-ply wood ⅜-in. thick. This means that for the attachment of most baseboard-mounting components you can standardise on ¾-in. wood screws and be sure that they will not go right through the back of the baseboard into the table on which you are assembling the set. (1)

There are, however, a few cases of components where very thick lugs are used. Transformers, for example, are nowadays generally made with bakelite cases and the lugs are usually about ⅜-in. thick. (2) A good supply of both ¾- and ⅝-in. screws should therefore be kept on hand as one or other of these will be suitable for practically every component which you screw to the baseboard.

So far as the screws themselves are concerned these can be either brass, with round heads, or black japanned iron, with round heads. Avoid like the plague any thin brass screws, for plywood is quite hard and in a large number of cases while you are screwing down your component—"snick," the screw will break, leaving itself broken off flush with the baseboard in such a way as to be very difficult to remove. This will prevent your attaching the component exactly where you wanted it to be and may spoil your layout.

JAPANNED STEEL SCREWS

Personally I nearly always use black japanned steel screws which can be obtained from any ironmonger's and are quite cheap. They do *not* break off in normal use and they have the great advantage that if you magnetise your screwdriver it will pick them out of awkward corners of the set!

Sometimes you will find a component in which the holes in the fixing lugs are actually larger than the heads of the screws you are accustomed to use. Some manufacturers are still very silly and careless about these things and do not realise the trouble they give.

Instead of trying to get a screw with a large enough head to hold it down (a difficult matter because large screws usually have long shanks which will go right through the baseboard) look round in your scrap box and see if you can find an old soldering lug, nip off the tongue of this and you will have a washer with a hole in the centre which will take your ordinary round-headed screw, the washer itself being bigger than the hole in the component that you want to secure. (3)

In a large number of designs nowadays you will have either a metal-foil covered baseboard or else one which has been sprayed with metal and gives a similar conducting surface. This surface is joined to earth and you may want to make a number of connections to it. To copper foil you can make a soldered connection, and to some of the metallised baseboards, but you cannot do this to aluminium foil, which does not solder in the ordinary way.

In any case soldering to the metal foil is a messy business and you will find it a much better way to take a ¾-in. screw, slip it through a soldering lug and screw it down to the baseboard, bending the soldering lug upwards at an angle. You can now solder this neatly and conveniently. The surface underneath the screw pressed against the metal baseboard will give you just as perfect a connection as you can desire. (4)

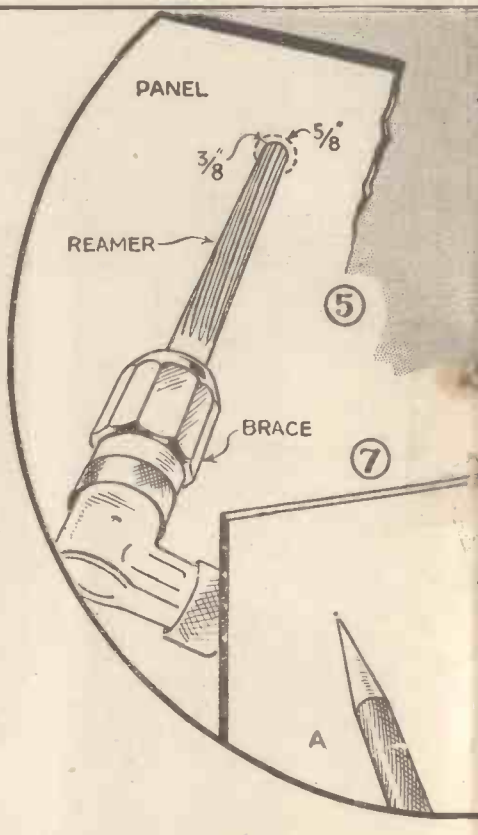
Never try to use a screw which is a tight fit, in a bakelite moulding. Ten to one the screw shank (which is slightly conical in many cases) will force its way into the hole and quite likely split off the lug and ruin the component. You have no idea how many home-built sets I have looked at which have had damaged components through such treatment.

Some home constructors, who do not mind within reason what they spend on components, seem frightened to lay out a few pence on one or two packets of screws. Half-a-crown's worth of wood screws of various sizes chosen at the local ironmonger's will serve for all the sets you are likely to want to make for several years.

PANEL-MOUNTING COMPONENTS

Most panel-mounting components require the panel hole to be ¾-in. diameter and as most people have such a drill, making these holes does not present much difficulty. There are, nevertheless, a few components which are secured by making a fairly large hole, inserting the threaded shank of the component, and screwing on a collar which fits into the hole of the panel. I hate these components myself, but a few still exist that require a hole to be made much bigger than ⅜ in.

The best plan, I find, is to make a ⅜-in. hole first of all, then widen it out with a reamer, which should be of sufficient diameter to clear a hole up to ⅝-in. diameter. You can get one of these from a tool shop very reasonably, and its use is preferable to buying larger drills,



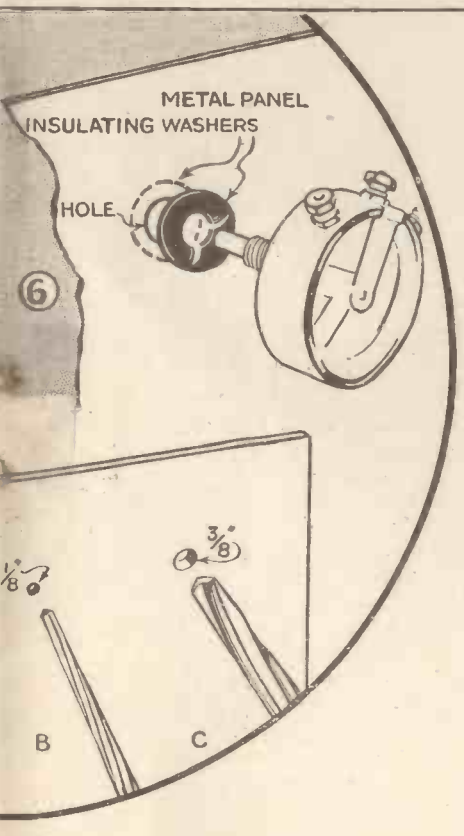
Set Builders Some Hints on ifficulties in Set onstruction

cessful Set Building

as you can make the holes to exactly the size you want by trial and error. (5)

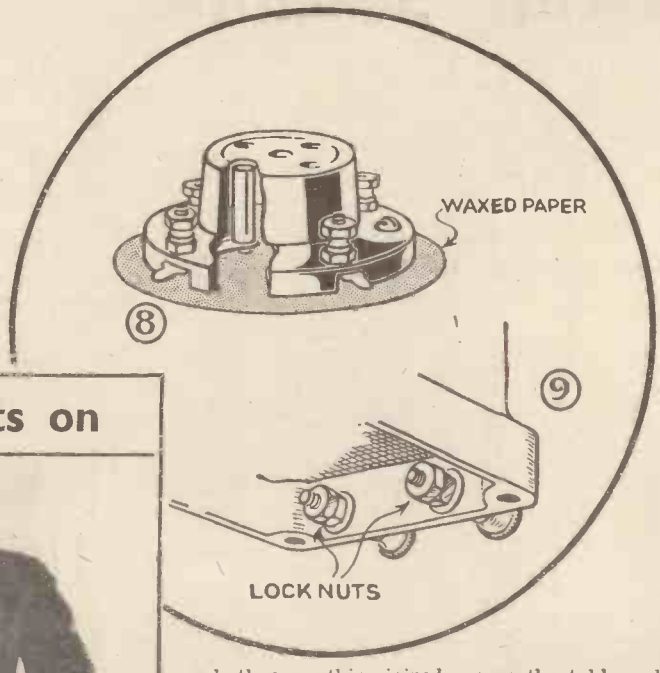
One still finds some panel-mounting components (such as potentiometers, reaction condensers and the like) the spindle of which is "live" or joined to one of the terminals. This is bad design and a relic of the days when all panels were insulating. Take, for example, a differential reaction condenser. This component has three terminals, one joined to the moving plates and generally taken to the plate of the valve, a second which goes to the reaction winding and a third which goes to earth.

If, as occasionally happens, the moving plates are in electrical contact with the fixing bush, and if a metal or metal faced panel is used, then anything joined to the moving plates will go straight to the metal panel, which is almost invariably earthed.



Sometimes you find potentiometers with the spindle attached to the moving contact and again if these are used on a conducting panel faults through short-circuits may arise.

If you *must* use one of these components and your panel is conducting you should bore your hole larger than otherwise would be the case and slip over the spindle an insulating collar to keep it from coming in contact with the panel. These insulating rings and collars are supplied with some components and can be obtained from several manufacturers through your dealer. (6)



SYMMETRY

Perhaps the commonest of all faults in home construction is a lack of symmetry either in the placing of panel components or the use of knobs. Most published designs have a symmetrical layout and most home constructors start off with the intention of adhering to this, but by the time the set is finished there is often just sufficient difference in level between two components, equally spaced on each side of the central knob, to spoil the balance.

I have looked into a number of cases of panels which have "gone wrong" for this reason and have almost invariably found that the trouble has been inaccurate drilling. The panel has been carefully marked out and a pencil cross or other mark made where the drill must go, but the home constructor has usually been in such a hurry that the drill has shifted sideways by $\frac{1}{8}$ in. or so without his noticing it.

Now most panel holes are rather large—$\frac{3}{8}$ in. in diameter is a frequently used size—and it is by no means easy to place the point of a $\frac{3}{8}$-in. drill on a small mark and keep it there. The best thing to do, and the practice I invariably follow myself when drilling panels, is first of all to mark out the positions accurately, secondly to drill each hole with quite a small drill—$\frac{1}{8}$ in. at the largest—making sure the positions are correct and then using these drill holes as a guide for the larger drills. (7)

Furthermore, if you have a polished mahogany or walnut panel and you mark it out on the back it is greatly preferable to drill your holes through with small drills first and then to turn the panel over with its *back* on the table, afterwards drilling from the front. This will preserve the front surface from many scratches it would otherwise get and will prevent its breaking away in splinters as sometimes happens when you are drilling from the back.

By the way, whatever kind of panel you are drilling, metal, ebonite or wood, lay it face downwards on at least half a dozen sheets of newspaper before drilling and make sure the table underneath is quite flat and not likely to be damaged by your drills.

SECURING PANEL TO BASEBOARD

Securing the panel perfectly to the baseboard seems to give many constructors difficulty, but there should be no trouble if on the back of the panel and along its bottom edge you draw a line equal to the thickness of the baseboard and drill three holes, one at each end and one at the exact centre, so that the holes will come half way down the edge of the baseboard when the panel is held upright against it. The holes drilled should be only just big enough to take the wood screws you are going to use, and then if you take a perfectly flat table and place the baseboard on it and hold the panel vertically in front there will be no difficulty in screwing the centre screw into position.

This will clamp the panel upright against the front edge of the baseboard. The two end screws can then be inserted and screwed up tight. Unless there are very heavy components on the panel, brackets are seldom necessary nowadays.

VALVE HOLDERS

A number of valve holders on the market are so made that if one presses a valve firmly into the socket the central springy portion bears downwards and either the pins of the valve or the metal springs of the anti-microphonic mountings come into contact with the baseboard. This does not matter if it is a wooden baseboard, but if it is either metallised or metal-covered the batteries will be short-circuited.

Two or three pieces of wax paper cut to the shape of the underside of the valve socket will prevent this and will be quite invisible when the valve holders are screwed down. (8)

LOOSE TERMINALS

One final tip. If when finally screwing down your connections you find a terminal on any component is loose and turns round and round, disconnect the other wires, remove the component from the baseboard and put this matter right at once. It is usually due to the screw on which the terminal runs not being locked tightly by a nut. (9)

Broadcasting Stations

Wavelengths are brought up to date week by week. For the purpose of better comparison, the power indicated is that of the carrier wave.

Metres	Kilocycles	Station and Call Sign	Country	Power (Kw.)
16.86	17,790	Daventry (GSG) ...	Great Britain	20.0
19.56	15,330	Schenectady (W2XAD)	United States ...	20.0
19.68	15,234	Paris (Coloniale) ...	France	15.0
19.73	15,200	Zeesen (DJB)	Germany	8.0
25.20	11,905	Paris (Coloniale) ...	France	15.0
25.28	11,865	Daventry (GSE) ...	Great Britain ...	20.0
25.4	11,810	Rome (2RO)	Italy	15.0
25.51	11,760	Zeesen (DJD)	Germany	8.0
25.53	11,750	Daventry (GSD) ...	Great Britain	20.0
25.57	11,730	Huizen (PHI)	Holland	40.0
25.63	11,705	Paris (Coloniale) ...	France	15.0
30.0	10,000	Madrid (EAQ)	Spain	20.0
31.25	9,598	Lisbon (CTIAA)	Portugal	2.0
31.3	9,585	Daventry (GSC) ...	Great Britain	20.0
31.38	9,560	Zeesen (DJA)	Germany	8.0
31.55	9,510	Daventry (GSB)	Great Britain	20.0
31.6	9,490	Poznan (SRI)	Poland	1.0
37.33	8,036	Rabat (CNR)	Morocco	6.0
38.47	7,799	Radio Nations (HBP)	Switzerland	20.0
42.92	6,990	Oslo (LCL)	Norway	0.5
45.38	6,610	Moscow	U.S.S.R.	10.0
46.69	6,425	Boundbrook (W3XL)	United States ...	1.0
48.86	6,140	Pittsburgh (W8XK)	United States ...	40.0
48.94	6,130	Mexico (XETE)	Mexico	2.0
49.02	6,120	Wayne (W2XE)	United States ...	1.0
49.18	6,110	Chicago (W9XF) ...	United States ...	5.0
49.18	6,110	Boundbrook N.J. (W3XAL)	United States ...	18.0
49.4	6,073	Skamlebaek (OXY)	Denmark	.5
49.5	6,060	Nairobi (VQ7LO)	Kenya Colony ...	.5
49.55	6,055	Vienna (UOR2) ...	Austria	.5
49.59	6,050	Daventry (GSA) ...	Great Britain	20.0
49.83	6,020	Zeesen (DJC)	Germany	10.0
50.0	6,000	Moscow (RNE)	U.S.S.R.	20.0
50.26	5,969	Vatican (HVJ)	Italy	10.0
202.2	1,483	Tarragona (EAJ33)	Spain	.25
203	1,478	Bilbao	Spain	.25
204	1,470	Seraing	Belgium	.3
204.7	1,465.4	Liege (Exp.)	Belgium	.35
207.4	1,446	Verviers	Belgium	.25
209.8	1,429	Miskolcz	Hungary	1.25
209.8	1,429	Magyarovar	Hungary	1.2
209.8	1,429	Pecs	Hungary	1.2
211.3	1,420	Newcastle	Great Britain	1.0
214.3	1,400	Aberdeen	Great Britain	1.0
215	1,395	Liege (Reg)	Belgium	0.35
215.6	1,391	Chatelineau (EL) ...	Belgium	.2
217.1	1,382	Konigsberg	Germany	.5
217.1	1,382	Dublin	Irish Free State	1.2
218.5	1,373	Salzburg	Austria	1.5
218.5	1,373	Plymouth	Great Britain	.2
220	1,365	Beziers	France	1.0
220	1,365	Turin (2)	Italy	1.0
222.1	1,351	Binche	Belgium	.2
223.5	1,342	Antwerp	Belgium	.4
224.4	1,337	Cork (6CK)	Irish Free State	1.2
225.9	1,327.3	Fecamp	France	10.0
227.4	1,319	Bremen	Germany	1.5
227.4	1,319	Flensburg	Germany	.5
227.4	1,319	Hanover	Germany	1.5
230.6	1,301	Malmo	Sweden	1.25
232.4	1,295	Kiel	Germany	.25
232.8	1,289	Wallonia (Binche)	Belgium	.3
235	1,283	Lodz	Poland	2.2
235.9	1,271.5	Bordeaux (S.O.) ...	France	3.0
237.8	1,261.3	Nimes	France	1.0
238.9	1,256	Nurnberg	Germany	2.0
240.6	1,247	Stavanger	Norway	.5
242.3	1,238	Belfast	North Ireland ...	1.0
242.7	1,236	Liege	Belgium	.3
244.1	1,229	Basle	Switzerland	.5
245.9	1,220	Linz	Austria	.5
247.7	1,211	Trieste	Italy	10.0
250.1	1,199.7	Juan-les-Pins	France	1.0
251.5	1,193	Barcelona (EAJ15)	Spain	1.0
253	1,185	Gleiwitz	Germany	5.0
255.1	1,176	Toulouse (PTT)	France	.7
257.3	1,166	Horby	Sweden	10.0
259.3	1,157	Treves (Trier)	Germany	2.3
259.3	1,157	Frankfurt-A-M	Germany	17.0
259.3	1,157	Cassel	Germany	0.5
261.6	1,147	London National ...	Great Britain	50.0
261.6	1,147	West National ...	Great Britain	50.0
263.8	1,137	Moravska-Ostrava	Czechoslovakia	11.0
265.7	1,129	Lille (PTT)	France	1.3
267.4	1,122	Nyiregyhaza	Hungary	6.3
267.6	1,121	Valencia	Spain	3.0
269.8	1,112	Bari	Italy	20.0
271.5	1,105	Rennes (PTT)	France	1.3
274	1,095	Turin (Torino)	Italy	7.0
276.5	1,085	Heilsberg	Germany	75.0
279.5	1,073	Bratislava	Czechoslovakia	14.0
281.2	1,067	Copenhagen	Denmark	.75
282.2	1,063	Lisbon (Tests)	Portugal	20.0
283.6	1,058	Innsbruck	Austria	.5
283.6	1,058	Berlin (E)	Germany	.5
283.6	1,058	Magdeburg	Germany	.5
283.6	1,058	Stettin	Germany	.5
285.1	1,052	Radio Lyons	France	1.0
286	1,049	Montpellier	France	.9
288.5	1,040	Bournemouth	Great Britain	1.0
288.5	1,040	Scottish National ...	Great Britain	50.0
291	1,031	Vilpuri	Finland	13.2
293	1,022	Kosice	Czechoslovakia	2.5
293.7	1,021.5	Limoges (PTT)	France	.7
296.1	1,013	Hilversum	Holland	20.0
298.8	1,004	Tallinn	Estonia	11.0
298.8	1,004	Salonika	Greece	1.5
301.5	995	North National	Great Britain	50.0
304	986	Bordeaux (PTT)	France	13.0
307.6	975	Vitus-Paris	France	1.0
309.9	968	Tchernigov	U.S.S.R.	10.0
309.9	968	West Regional	Great Britain	50.0
312.5	960	Genoa	Italy	10.0
312.8	959	Cracow	Poland	2.0
315.8	950	Marseilles	France	1.6
318.8	941	Sofia (Rodno Radio)	Bulgaria	.5
318.8	941	Dresden	Germany	.25
319.5	939	Naples	Italy	1.3
321.9	932	Goteborg	Sweden	10.0
325	923	Breslau	Germany	60.0
328.2	914	Poste Parisien	France	60.0
332.2	903	Milan (Siziano)	Italy	50.0
334.4	897	Poznan	Poland	2.0
338.2	887	Brussels (No. 2)	Belgium	15.0
342.1	877	Brunn (Brno)	Czechoslovakia	32.0
345.2	869	Strasbourg (PTT) ...	France	11.5
348.8	859.2	Leningrad	U.S.S.R.	100.0
349.6	858	Barcelona (EAJ1) ...	Spain	8.0
352.1	852	Graz	Austria	7.0
355.9	843	London Regional ...	Great Britain	50.0
360.6	832	Stuttgart (temp) ...	Germany	1.5
363.6	825	Algiers (PTT)	North Africa	13.0
364.1	824	Bergen	Norway	1.0
366.5	818	Fredriksstad	Norway	0.7
368.1	815	Bolzano	Italy	1.0
368.1	815	Helsinki	Finland	13.2
368.1	815	Seville (EAJ5)	Spain	1.5
370.1	810	Radio LL Paris	France	0.8
372.2	806	Hamburg	Germany	1.5
376.4	797	Scottish Regional ...	Great Britain	50.0
380.7	788	Lwow	Poland	16.0
385.1	779	Radio Toulouse	France	8.0
385.1	779	Stalino	U.S.S.R.	10.0
389.6	770	Leipzig	Germany	150.0
394.2	761	Bucharest	Roumania	12.0
398.9	752	Midland Regional ...	Great Britain	25.0
403	743	Sottens	Switzerland	25.0
408.7	734	Katowice	Poland	12.0
413	725	Athlone	Irish Free State	80.0
416.4	720.5	Rabat	Morocco	6.0
419.9	716	Berlin	Germany	1.5
424.3	707	Madrid (EAJ7)	Spain	3.0
424.3	707	Moscow (ROZ)	U.S.S.R.	100.0
431	696	Belgrade	Yugoslavia	2.8
436	689	Stockholm	Sweden	55.0
441.2	680	Rome (Roma)	Italy	60.0
447.1	671	Paris (PTT)	France	7.0
447.1	671	Danzig	Danzig	.5
451.8	664.1	Madona	Latvia	15.0
451.8	664	Agen	France	.2
452.8	663	Milan (Vigentino)	Italy	4.0
453.2	662	Odessa (RDH)	U.S.S.R.	15.0
453.2	662	Klagenfurt	Austria	.5
456.6	657	San Sebastian	Spain	5.0
459.4	653	Beromunster	Switzerland	60.0
465.8	644	Lyons (PTT)	France	15.0
472.4	635	Langenberg	Germany	60.0
480	625	North Regional	Great Britain	50.0
488.6	614	Prague	Czechoslovakia	120.0
495.8	605	Trondheim	Norway	1.0
501.7	598	Florence	Italy	20.0
501.7	598	Gorki	U.S.S.R.	10.0
508.5	590	Astrakhan	U.S.S.R.	20.0
509.3	589	Brussels (No. 1)	Belgium	15.0
518.1	579	Vienna	Austria	100.0
525.3	571	Riga	Latvia	15.0
532.9	563	Munich	Germany	1.5
539.8	555.7	Palermo	Italy	3.5
542	554	Sundsvall	Sweden	10.0
550.5	545	Budapest (1)	Hungary	120.0
555.5	540	Wilno	Poland	22.0
559.7	536	Tampere	Finland	1.0
559.7	536	Kaiserslautern	Germany	1.5
559.7	536	Augsburg	Germany	.25
565.5	530.5	Freiburg i/B	Germany	0.25
569.3	527	Grenoble (PTT)	France	3.0
577.3	519.6	Ljubljana	Yugoslavia	7.5
582.6	515	Tartu	Estonia	.5
690	434.7	Oulu	Finland	1.2
746.2	402	Moscow (RMO)	U.S.S.R.	20.0
747.2	401.5	Ostersund	Norway	0.6
760	395	Geneva	Switzerland	1.25
833	360.1	Heston Airport	Great Britain	5.05
844.8	355	Budapest (2)	Hungary	3.0
1,000	300	Moscow (ROZ)	U.S.S.R.	100.0
1,071.4	280	Tiflis	U.S.S.R.	35.0
1,083	277	Oslo	Norway	60.0
1,105	271.5	Minsk (RMG)	U.S.S.R.	35.0
1,115	269	Moscow (Popoff)	U.S.S.R.	40.0
1,137.	263.8	Monte Ceneri	Switzerland	15.0
1,153.8	260	Kalundborg	Denmark	30.0
1,190.5	252	Luxembourg	Gd. Duchy of Lux.	200.0
1,200	250	Istanbul	Turkey	5.0
1,200	250	Reykjavik	Iceland	21.0
1,255	239	Vienna (Exp.)	Austria	3.0
1,276.3	235	Tunis	Tunisia	.75
1,304	230.1	Leningrad	U.S.S.R.	100.0
1,348	222.5	Motala	Sweden	30.0
1,411.8	212.5	Warsaw	Poland	120.0
1,445.8	207.5	Eiffel Tower	France	13.0
1,481	202.6	Moscow (RTC)	U.S.S.R.	500.0
1,554.4	193	Daventry National	Great Britain	30.0
1,634.9	183.5	Zeesen	Germany	60.0
1,724.1	174	Radio Paris	France	75.0
1,796	167	Lahti	Finland	54.0
1,875	160	Kootwijk	Holland	50.0
1,875	160	Moscow (RCZ)	U.S.S.R.	100.0
1,875	160	Brasov (tests)	Roumania	20.0
1,935	155	Kaunas	Lithuania	7.0

Re-grouping Europe's Transmitters

By JAY COOTE

FOR purposes of economy, on the Continent a considerable amount of reorganisation is taking place with a view to the re-grouping of transmitters. The method used is somewhat different to the National and Regional principle adopted by the B.B.C., but its eventual aim is the provision of alternative programmes for a greater number of listeners.

Some little time ago, Italy achieved this object by forming a Northern and Southern group, with mutual interchange of programmes, and to facilitate at Milan and Turin the reception of the Rome and Naples entertainments, installed, or rather "revived," small transmitters in each city.

Three German Networks

Germany now, with a similar end in view, has formed three networks, namely, *Nord*, *West* and *Süd-West Gruppe*, which include respectively :—

(1) Berlin, Magdeburg, Stettin, Hamburg, Hanover, Flensburg, Kiel, Bremen, Königsberg, Heilsberg, and Danzig.

(2) Frankfurt, Trier, Cassel, Cologne (Langenberg), Stuttgart, and Freiburg.

(3) Munich, Nurnberg, Kaiserslautern, Augsburg, Leipzig, Dresden, Breslau, and Gleiwitz.

In future, therefore, from that country, apart from the special entertainments broadcast from the *Deutschlandsender* (Königswusterhausen), we shall only get *three* different programmes, as the transmissions in each group will go out on the S.B. system.

On the other hand, the authorities have realised that with the recent electioneering addresses, their nationals have had a surfeit of political speeches and have now deserved some compensation.

It will be found in a greater percentage of musical programmes (with official pronouncements and tubthumping cut down to a minimum) and especially in somewhat prolonged broadcasting hours. Later entertainments are also now given by Langenberg, Frankfurt and Mühlacker.

Austria is the third country to attempt a reorganisation of a similar character. Possibly this will not take place before January 15, and may coincide with the wavelength alterations.

Two New Relay Stations

Two more relays are to be erected, at Leoben and Villach, to increase the areas of respectively Klagenfurt and Linz. Leoben lies about eighty miles to the south-west of Vienna; Villach is situated in Carinthia near the Italian frontier. Linz, Klagenfurt and the new Vorarlberg (Bregenz) station will work as one group; Graz, Salzburg and Villach as another.

◆ ◆ ◆

Some alterations will be made when, on January 15, the Lucerne Plan comes into operation. Vienna will operate on 506.8 metres, Graz on 338.6 metres, Salzburg on 222.6 metres, and Innsbrück will take over a new channel borrowed from the shipping band, namely, 578 metres. Linz, Klagenfurt, and Bregenz will work on 231.8 metres.

◆ ◆ ◆

From Vienna, in any case in January, there is a treat in store for us; it is the production of a new comic opera, *Giudetta*, by Lehar, in which Richard Tauber will play the principal part. The performance will be relayed to the Austrian broadcasters and, it is hoped, will also be taken by the principal Continental stations.

WHEN THE AUDIENCE APPLAUDS

THERE IS A SUDDEN DRAIN OF 30 MILLIAMPS OR MORE ON YOUR HIGH TENSION BATTERY

In modern Transient Load receivers, current consumption depends upon the " noise-value " of the programme ; and when suddenly a thousand pairs of hands crash out the approbation of the audience, a heavy drain is thrown on your high-tension battery. This studio applause may take 30 milliamps or more of current, and an ordinary H.T. battery simply cannot stand up to such a drain—the voltage drops off alarmingly and immediately you lose all the advantages of your modern Class " B " and Q.P.P. output.

Now the cells of a Lissen Battery stand up to ANY sudden drain ; they give the required current without volt drop. The big oxygen content of the Lissen cells reduces internal resistance so that the battery can respond instantly to any demand. And all the time the current flow is smooth and silent, giving distortionless reproduction at a volume which really justifies the claim " Mains power from battery sets."

The Voltage of a

LISSEN BATTERY

stands up to ANY sudden drain!

SPECIAL SECTION FOR EXPERIMENTERS — CONDUCTED BY H. CORBISHLEY.

Your Wireless Set and the Cathode-ray Tube

Here is a number of interesting experiments which can be made with your wireless set and the cathode-ray tube. Most useful information can be obtained and the tube will reveal all the good and bad qualities of your receiver

THE owner of a cathode-ray tube will, no doubt, welcome a change from television experimenting during the Christmas holidays, and the suggestions given in this article will form the basis of an interesting demonstration of the other uses to which the tube may be put. One or two simple circuits will be required for some of

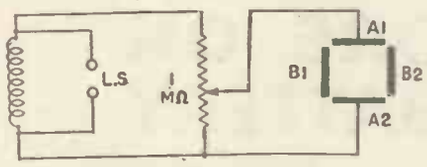


Fig. 1.—Connection of plates across loud-speaker for observation of acoustic wave-form. B1 and B2 plates are connected to the time base

the effects shown, but without going to any trouble the tube can be made to show some striking phenomena when applied to an ordinary radio receiver.

The deflector plates will draw no current from the circuit to which they are connected, and hence will not upset the

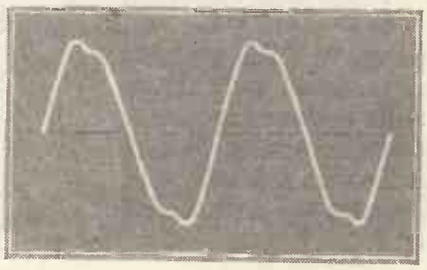


Fig. 2.—Typical wave-form of sustained pure note

operating conditions of the receiver when they are connected between any two points in it. On the other hand, the potential applied to the plates may be too high for a reasonable deflection and a high-resistance potentiometer is sometimes desirable to control the voltage applied to the deflectors.

With an anode voltage of 600 on the tube a good deflection would be given by 50 volts on the plates, and this figure should be borne in mind when the tube is connected to the receiver. It is always comforting to think that the tube will not be damaged by excessive voltage applied to the deflector plates, the only effect being that of forcing the beam off the screen.

The simplest effect to study is the audio frequency wave-form applied to the loud-speaker, and for this a single linear time base will be required, constructed according to the article in the issue of October 28, page 774. The vertical deflector plates are connected directly across the loud-speaker transformer secondary terminals, and the voltage will usually be found sufficient to give a good deflection. If it is too high, a 1-megohm potentiometer may be connected across the plates as shown in the circuit of Fig. 1.

Since the frequency of the notes from the speaker is continually varying, it will seldom happen that the wave remains stationary on the screen, but the speed of the time base can be adjusted to give a stable well-defined wave for the greater part of the time. When a single note is sounded in the middle of an orchestral piece the wave-form of the instrument will stand out like the example in Fig. 2.

Checking a Radiogram

If a radio-gram is available, a constant frequency record can be used to give a steady wave-form, and this can be used to check the constancy of the gramophone motor. A wavering motor, or an irregularity in the turntable rotation will cause the wave-form to oscillate slowly backwards and forwards across the screen. Incidentally a constant-frequency record is invaluable for checking distortion in audio-frequency stages in a receiver. The deflector plates can be arranged by means of

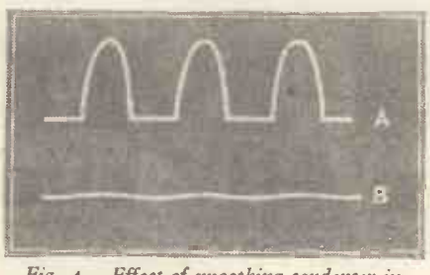


Fig. 4.—Effect of smoothing condenser in rectifier circuit

a change-over switch to record the wave in the first L.F. circuit and compare it with the wave at the speaker terminals.

If a constant-frequency record is not

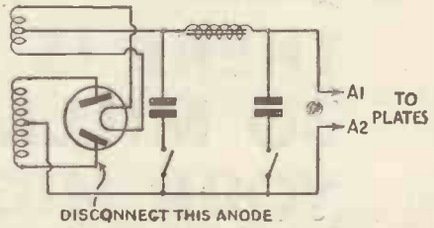


Fig. 3.—Rectifier circuit arranged to show half-wave rectification and effect of smoothing

available, a good effect can be obtained by disconnecting the set from the aerial and increasing the reaction until it howls. With careful adjustment a low growl can be obtained which will record easily with the time base running at a moderate speed.

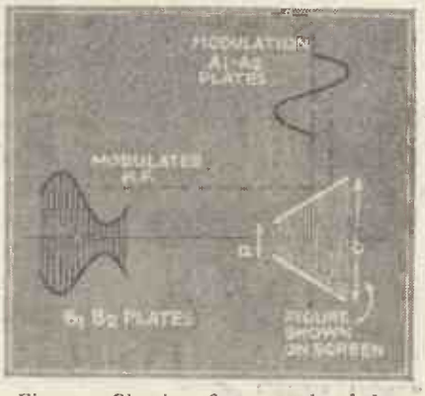


Fig. 5.—Showing figure produced by modulated H.F. on the plates

With sets employing battery bias, it is an easy matter to show the effects of over bias on the amplifying valve, and to see how, in extreme cases, the valve will rectify the audio-frequency signal. It is advisable to disconnect the speaker during these experiments to avoid distracting the attention of the audience by the dreadful sounds emitted.

Continued on page 1110

Amateur Television—*Cont. from page 1108*

Speaking of rectifying, it is surprising how little the functions of the reservoir and smoothing condensers in a mains unit are appreciated, and the cathode-ray tube shows their use in a very striking way.

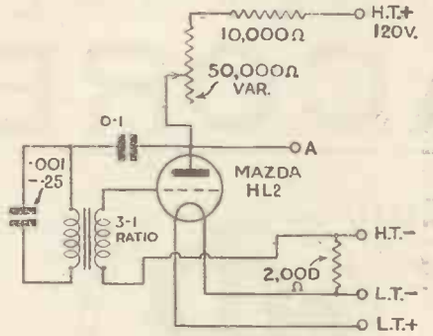


Fig. 6.—Circuit of simple audio-frequency oscillator for experiments with wave-forms

To obtain the best effect the rectifier should be modified to half wave by disconnecting one anode terminal of the normal full-wave rectifier. The set should be disconnected so that the rectifier is on no-load, and the deflector plates should be connected directly across the H.T. terminals through a potentiometer (Fig. 3). Disconnect both condensers at the points marked X, X and switch on. The wave-form of a half-wave rectified voltage will appear on the screen, but considerably displaced from the centre. This is because the D.C. component of the voltage is permanently pushing the beam off centre. The movement can be controlled, however, by connecting a bias battery in series with the opposite plate and adjusting its value until the wave appears as Fig. 4 (*a*).

Now reconnect the reservoir condenser and the result will be as Fig. 4 (*b*). The voltage will be practically free from ripple. In that case what is the use of the smoothing choke and second condenser? The answer is given at once on putting a load on the rectifier. As soon as the set is reconnected the reservoir condenser loses its charge and the humped wave reappears. The addition of the choke and the second condenser will once more restore the voltage to the approximate straight line of Fig 4 (*b*).

An interesting effect, but one slightly more difficult to obtain, is that of the figure produced by the application of modulated radio-frequency to the deflector plates. If the radio input is applied to the plates with the beam deflected by the time base, the ordinary modulated carrier wave can be seen if the voltage is sufficiently high to produce a good deflection. A better plan is to dispense with the time base and connect one pair of plates across the audio frequency and the other across the modulated radio frequency. The resulting figure on the screen will be a sort of irregular triangle with a blunt apex if the modulation does not reach 100 per cent. The reason for the figure is seen from the details of Fig. 5, which show the effect of each wave on the beam and the resulting deflection.

As said above, this picture is difficult to obtain on an ordinary receiver, but with a modulated oscillator it can easily be produced and the depth of modulation measured by comparing the heights marked *a* and *b* in the figure. (If the modulation is linear the coefficient of modulation is $\frac{b-a}{b+a}$ measured from the figure.)

An audio-frequency oscillator for experiments in wave form can be simply constructed from the stock components found in most experimental workshops. The theoretical circuit is shown in Fig. 6 and with the values shown the frequency can be varied from 100 to 5,000 cycles per second, but this depends on the type of transformer used to couple the anode and grid circuits. With an old Ferranti 3-to-1 transformer inverted the figures quoted were obtained with three different values of tuning condenser ranging from .001 to .25 microfarad. However, the circuit is bound to oscillate if the transformer is connected round the right way and the values of the components can be left to the taste and sense of the constructor.

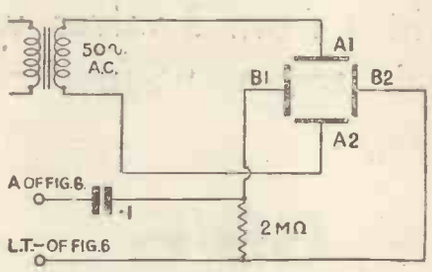


Fig. 7.—Connections for making patterns with the oscillator of Fig. 6

Using a 50-cycle mains supply for one pair of deflector plates and with the oscillator connected across the other pair,

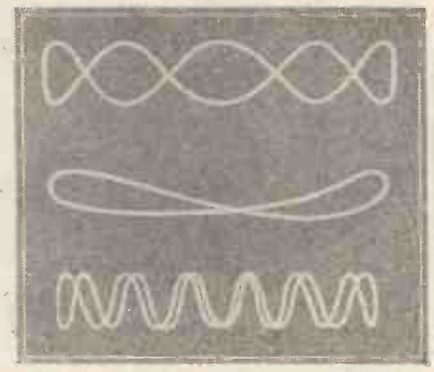


Fig. 8.—Patterns made by the oscillator of Fig. 6 used with a 50-cycle A.C. supply on the other pair of plates

a variety of beautiful patterns can be obtained which will delight the "lay" members of any audience.

The circuit of Fig. 7 shows the connections for producing the patterns, and Fig. 8 gives an indication of some of the simplest forms produced.

Small Motors and Scanning Disc Speed

QUITE small motors, such as are used for model purposes, are often used with success for driving scanning discs, but sometimes it happens that the power of the motor is just a little less than is required to keep the disc running at the full speed of 750 revolutions per minute. In such cases there is an effective dodge that can be resorted to slightly to reduce the amount of power which is necessary. This consists of reducing the size of the disc by cutting round the periphery with a pair of scissors. An appreciable amount can be trimmed off without in any way impairing the disc and usually it will be found that the slight reduction of weight and lessened air friction will be just sufficient to enable the motor to do its work. Of course if the power of the motor is very much below the standard this procedure may not be effective, but generally it will make up for a lack of from 25 to 50 revolutions per minute.

Your Earth Connection

IS the wireless earth as important as it used to be? Many listeners are asking that question. They have found by experience that the modern set seems to work just as well without an earth as with one.

They tell us they can get as many foreign stations using just the aerial and no earth, as they can get when an earth is carefully installed and connected up; that the strength of the foreigners is just as good without an earth as with one; that mains hum is no less and no more apparent with an earth than without.

The Great Earth Fallacy

So, say these listeners, what about this great earth fallacy? Why continue to say the earth is important?

These are knotty questions. Yet there is a catch in them. Do you spot it? Possibly not. The catch is that in mentioning these earths of doubtful virtue our correspondents do not give any details of the *type* of connection used.

All too frequently we find that, when a reader complains he can detect no difference with or without an earth lead on his set, only a very poor earth has been installed—a gas-pipe connection, a water tank that does not lead to anywhere in the earth, or a feebly buried spike or tube.

You may take it that if an earth makes no difference at all to your set, it is a *bad* earth. That is axiomatic—except, of course, with frame aerial sets, such as portables.

If you take pains with your earth you will find that its connection will improve your reception, no matter how powerful it may be. The theory of the earth is not easy to understand, but you can take it that when you make a good low-resistance contact with earth, you are virtually making an electrical image of your aerial.

The earth, never forget, is just a part of the aerial-earth system, up and down which wireless signals oscillate. If there is no earth connection you are making things difficult for those wireless waves, which have to make do with whatever substitute they can find as an earth. The chassis of the set may make a sort of capacity earth; in fact, often when you imagine that your set is working entirely without an earth the metal part of the set is actually acting as one.

Manifold Good Effects

The good effects of a well-installed earth are manifold. You get cleaner signals, more stable working, less background noise from the mains and, in short-wave sets, infinitely easier tuning and reaction control.

So just remember this about the wireless earth: if its connection to the set makes no difference to your reception, it is probably a bad earth. Your remedy is obvious—put in a solid plate or one of the new "Chemical" earths and solder the stranded earth wire to it, or make a really low-loss connection with stout wire to a main water pipe. J. B.

Sets of the Season Tested

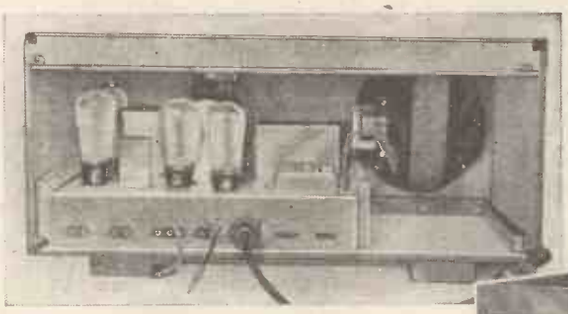
Lissen A.C. Three-valver

IT is unusual for kit receivers to include so many refinements that are usually associated only with higher-priced sets. The Lissen All-electric Three is a three-valve receiver (not counting the full-wave rectifying valve). It consists of a variable-mu screen-grid high-frequency stage, a steep-slope detector and a pentode output valve having an amplification factor of 70. It is, of course, built on a steel chassis, with all of the major components completely screened.

The receiver is full of useful refinements, such as three aerial tappings to give adequate selectivity under all conditions. Two alternative sockets are provided for a tone control, giving high- or low-note emphasis. There are six alternative sockets for A.C. voltage, making the receiver suitable for any voltage between 100 and 125, 200 or 250 volts. Of course, provision has been made for an external loud-speaker.

The receiver can be operated without any external aerial at all. The wander plug attached to the lead coming through the chassis immediately above the three aerial sockets, marked A1, A2 and A3, should be inserted into the socket from which the best results are obtained. Lissen's recommend that up to distances not exceeding ten miles from a broadcasting station, A3 should be used, or A2 up to 40 miles, leaving A1 to give fairly flat tuning when a long way from the station.

The receiver is very simple to operate as the tuning scale is calibrated in wavelengths, varying between 200 and 550 metres and 825 to 2,000 metres. For those who are not used to this method of marking, the approximate positions for the regional stations are clearly marked.



Two views of the Lissen A.C. three-valver reported on this week

Brief Specification

Makers : Lissen, Ltd.

Model : A.C. Three, type LN8039.

Price : £10 10s.

Valve Combination : High-frequency amplifier, AC/SGV; three-electrode detector, AC/HL; pentode output, PT425; and full-wave valve rectifier, U650.

Type : Table model, suitable for A.C. mains, any voltage between 100 and 125, or 200 and 250 volts.

Remarks : An ideal set for the home constructor which, when completed, has a very professional look.

When this receiver was tested on a 25-ft. aerial, twenty miles from London, the daylight range was really remarkable. Huizen, Radio Paris, Zeesen and Daventry could all be tuned-in at full loud-speaker strength without mutual interference, while later in the day Warsaw, Motala, Kalundborg and several Russian stations were picked up.

On the medium waves thirty or forty stations could be tuned-in without touching the volume control and we feel sure that if the set were tuned carefully most of the powerful Continental stations could be received at will.

The reproduction is extremely good. Of course, the moving-coil loud-speaker (which was carefully matched to the pentode) had a lot to do with this. When the receiver is used with a gramophone pick-up, the volume is sufficient to fill a very large room. Perhaps that is why Lissens recommend that you use one of their needle-armature pick-ups.

This is one of the few sets that is entirely free from hum; even with one's ear in front of

the loud-speaker there is hardly any trace of ripple. It is supplied with a heavily insulated mains cable with a twin plug, making it suitable for a light or power socket.

Two .5-ampere fuses are fitted to this plug—so that should you have a mishap and blow your fuses they are very easily replaced. Compactness is a very desirable feature and the size of the walnut cabinet that houses this receiver is only 22 in. long by 10½ in. high by 9 in. deep.

A combination of good design and highly efficient valves makes this receiver one to be remembered.

Special Foreign Programmes

To the Editor, "Amateur Wireless."

SIR,—I have some information that will interest your readers. The Westinghouse stations KDKA and W8XK (48.86 metres) at Pittsburg are now putting over every week (at present at 5.15-6 a.m. G.M.T.), on Mondays, a programme of notes, tips, etc., arranged by the International Dx'ers Alliance and dedicated to us and our brother clubs.

I am also able to say that a special transmission will be put over from the Radio Strasbourg PTT station at 7-8.30 a.m. on December 30, on their wavelength of 345 metres (11.5 kilowatts power). I am enclosing a copy of the programme.

A programme will be put over from WRUF (830 kilocycles, 5 kilowatts), Gainesville Florida on December 14, at 7 a.m. G.M.T.

RICHARD S. RAWLES.
(I.D.A. Publicity Director.)

Newport, I. of W.

Programme Dedicated to I.D.A.

December 30, 1933.

7-8.30 a.m. G.M.T. Orchestra Radio Strasbourg
Direction : Maurice de Villars

1. March, "Stars and Stripes" ... ... *Sousa*
2. "Salut d Amour" ... ... *Elgar*
3. "Air d Caron" (Solo, M. Gillig) ... ... *Lully*
4. Air from *The Marriage of Figaro* (Solo, Mme. Ines Maujean) *Mozart*
5. Overture *William Tell* ... ... *Rossini*
6. Duet, "La petite mariee" (Mme. Maujean, M. Gillig) *Lecocq*
7. Prelude d En'tracte, *Cavalleria Rusticana* *Mascagni*
8. Duet, "La fille de Mme. Angot" (Mmes. Maujean, Jeanne Wild) *Lecocq*
9. Prelude, *The Deluge* ... ... *Saint Saëns*
10. Air, "Rose Marie" (Solo, Jeanne Wild) ... *Friml*
11. "Scenes Alsaciennes" ... ... *Massenet*
12. Air d Vilga, "La Veuve Togens" (Solo, Jeanne Wild) *Lehar*
13. March, "La pere da Victoire" ... ... *Ganne*

From Radio Strasbourg (PTT), 345 metres (11.5 kilowatts), on December 30, 1933, 7-8.30 a.m.

Self-adjusting Volume Control

IN the issue of AMATEUR WIRELESS dated November 18, "The Experimenters" described some experiments with a Mazda L2DD in a short-wave set. The circuit published with the article showed a .0003-microfarad condenser connected across the diode instead of from anode to filament. As this condenser connected across the diode reduces the voltage across the A.V.C. diode to one-quarter, as well as introducing a large fixed capacity across the primary of the intermediate-frequency transformer, it will materially reduce the performance of the receiver. This alteration is brought to our notice by the Mazda valve works, whose original circuit "The Experimenters" followed.

R. & A. Alpha Loud-speaker

WITH reference to the test report on the R. & A. Alpha loud-speaker that appeared on page 1026 of our December 2 issue we are asked by the makers to point out that the purpose of the sub-assembly carrying the diaphragm and speech coil is that distortion of the outer chassis, which carries the magnet and transformer only, in no wise affects the location of the speech coil in the gap, as is the case where the periphery of the cone is fixed to the same member as in ordinary types.

Good reproduction is obtained even when only a medium size of baffle is available.

Programme Criticisms by WHITAKER-WILSON

Without Fear or Favour

Average Listener says—

"What's Contemporary Music? According to my dictionary, the word contemporary means 'in our time.' I've been trying to apply that to the concerts of contemporary music from Broadcasting House on Friday nights.

"Does the B.B.C. mean to tell me the hyper-modern stuff really represents the best of the music written in our time?

"Perhaps if I went to Portland Place and watched them playing, I might appreciate some of it; but on the wireless it is more than I can stand.

"I'm only an average listener, and I'm anxious to learn, but I must say I don't think I shall ever get to like anything quite so ugly.

"What is the point of it, anyway. I thought music was always supposed to be beautiful?"

Monday

THERE is not much point in comparing or contrasting one dance band with another. Most of us have our likes and dislikes regarding them.

I listened to two excellent bands to-night. One was Carroll Gibbons and the Savoy Orpheans, and the other Sydney Kyte and the Piccadilly band. I enjoyed both. I admired both. All I offer in the way of criticism is that there was too much similarity in the tunes. There also might be a limit to variations on one theme. If it is not "Since I met Yew," it is "If I had only met Yew," or "When first I met Yew," "If I had never met Yew." It is always *Yew*, anyhow.

◆ ◆ ◆

Those fellows at the Radio Manufacturers' Association dinner had a good deal to say to each other. At all events, they kept us waiting for half an hour for the cabaret show.

Very good when it did come, though. Rex Evans made an excellent compère. He is one of the few who have grasped the principles of that delicate art.

While I think of it, Ivy St. Helier ought to be heard more often. Her imitation of an American woman trying to order *déjeuner* in a French hotel was one of the cleverest things I have heard for a long time.

John Tilley addressed that shareholders' meeting again. Excellent, of course, but I think it is the third time I have heard it. It may have been the Prince's first. If so, I am sure His Royal Highness enjoyed it.

Tuesday

Follies of the Air (for the second time of asking) ought now to have established the show as a type in broadcasting. Davy Burnaby manages to infuse the Folly style into everything he does. As it is a distinct style nothing more need be said. Good enough.

◆ ◆ ◆

It is quite possible to overdo regular features even in a ninety-hour week, but these transmissions of Students' Songs will stand a fair amount of repetition. It is certainly one excuse for the existence of the Wireless Male Voice Chorus, which seems to have improved a good deal lately.

Wednesday

Henry Hall was broadcasting when I came into the house this afternoon. *Another* performance of "Don't Blame Me!" Henry, old man, I have never blamed you. I swear it. I couldn't do such a thing. So don't plead with me like that so often. Even now, I am typing with tears in my eyes.

◆ ◆ ◆

Cortot said nothing new about the C-major Beethoven piano concerto, but what is there new to say about it? They all play it much the same.

Adrian Boult did manage to put a new construction on Mendelssohn's *Midsummer Night's Dream* overture. I want to hear him do it like that again—only in the summer, when I can listen in the garden.

Thursday

I hear *Scots Wha Hae*—on St. Andrew's Night—thrilled Scottish listeners. I can understand it. I wished I could have understood it.

Friday

I listened to *Red Tabs* with a copy of the manuscript before me. Val Gielgud once told me he thought it was not really a good play. Well, he's wrong. It *is* a good play because it drives home an interesting theme and isn't misty anywhere.

The worst point about it is that its story may have been true. One of the best in this series of revivals.

The singer in the Casani Club Orchestra has asked us not to blame him, either. Blame Eric instead. He gets most of the kicks just now.

Saturday

The third of the *In Town To-night* transmissions was a decided improvement on the other two.

◆ ◆ ◆

I was sorry I could not get that Chinese gentleman's name down—the one who walked and cycled twenty thousand miles. I wanted to ask him to let me go back with him. With a good portable I could write these notes just the same.

◆ ◆ ◆

How did you enjoy Mr. Forsythe's band? I thought it so different from most others I have heard as to be quite refreshing. Or is it that I am tired of the others?

Not that I have anything against Jack Hylton's. Smart lot. Even so, my conclusion was that "If You Were the Only Girl in the World" was the best tune he played. There is some real music in it. If you don't think so, *don't blame me!*

◆ ◆ ◆

Did you hear the talk about that film coming over here—the lynching business, I mean. The

An impression of Carroll Gibbons

speaker who defended it talked rubbish. We are far too morbid as it is.

If there were a public execution in Hyde Park to-morrow I don't believe there would be standing room at ten guineas a ticket. Just as well the B.B.C. allowed such a discussion. If the Home Secretary heard it—I hope he did—he should know what to do.

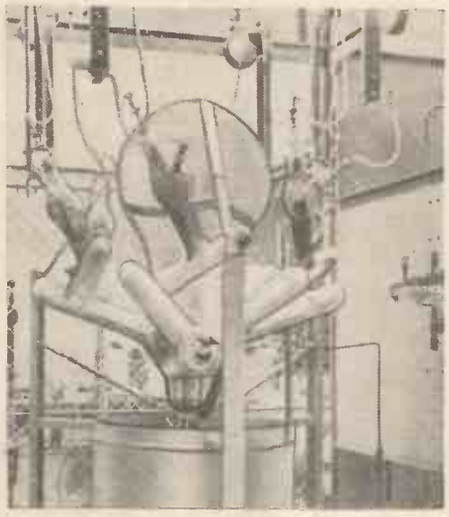
Sunday

I listened to Bach's *Ein' Feste Burg* because I like the tune of its chorale. A very dignified performance.

Our Christmas Cover

Our portrait of His Majesty the King appealed to all our readers. Here is an extract from a letter written by C. H. Hopwood, M.B., Ch.B., of Calstock, Cornwall, to a member of our staff:—

"Congratulate the Editor on his cover—it has caused great comment here."



Mystery at Bisamberg

NEAR Vienna is Bisamberg, now "on the map," etherically speaking, because it is the site of the new high-power Austrian broadcasting station. So far so good. Being a keen DX'er, and therefore greatly interested in anything connected with foreign stations, I eagerly waited for the photographs to arrive showing what this new ether giant was really like.

Came the photograph you see here. With it the cryptic caption: "An interior view of a section of the works." What do you know about *that*? I give you three guesses at the nature of the monstrous-looking piece of work you see in the foreground.

In fact you can have as many guesses as I did. To me it was something rather horrible. A hatefully shaped glass "God of the Machine." Look at its bulbous head, its sinuous tentacles, its quite disgusting outgrowths! Horrible, eh?

But personal feelings had to be ruthlessly suppressed. This was a first-class mystery. Austria, I always imagined, was a long way this side idolatory. Yet nothing less than a radio idol appeared to answer the question: what *is* it?

Feeling pretty grim, I went out with my mystery, determined to solve it, or forever deny myself reception of Bisamberg. Indeed, I felt that with such a monster in the building it could be only a matter of time before it got the upper hand, and then heaven help the poor unprotected engineers!

My first effort was not very helpful. A technically minded friend took one look at the photograph and said: "Well, what's the joke?" I assured him it was no joke, but he only laughed, the fool.

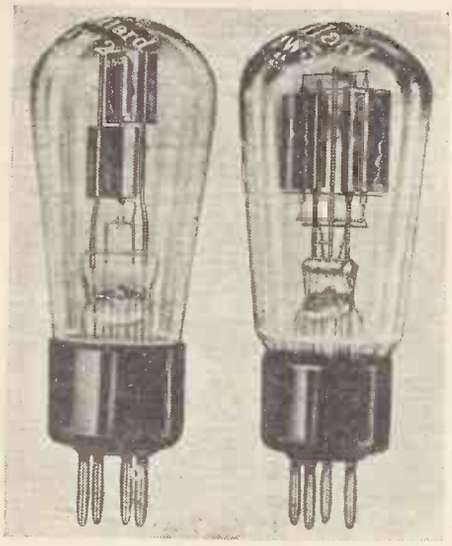
On to Broadcasting House. First official took one look at it and exclaimed: "Really, I never thought you were interested in deep-sea fishing."

Visibly weaker, I sent in my card to an engineer I knew slightly. "Have you ever come across anything like this before?" showing him the photograph. He yelled. "No, and I hope I never shall," he answered. "Gee, fancy *that* at Brookman's Park!"

So in desperation I consulted a Very High Authority. He wrote as follows: "The thing you take to be an idol or deep-sea monster is really only a mercury-vapour rectifier, or rather a bank of rectifiers. No, we don't use such things over here, but we shall have a *tank* rectifier at Droitwich."

I tell you this because you may see this photograph elsewhere. And a heartless editor may see fit to append the photographer's caption: "An interior view of a section of the works."

And that may keep you awake at night, as it did me O. H.



(Left) Mullard IW2 indirectly-heated rectifier and (right) the IW3

New Rectifiers

DIRECTLY-HEATED valves for receiving circuits went out of fashion many years ago. Why hasn't the directly-heated rectifying valve followed suit? It is well known that in an A.C. mains set the emission from the rectifying valve begins almost instantly, causing strain on the fixed condensers and other components.

To overcome this defect, delayed-action switches and other rather unnecessary gadgets of a similar nature were introduced. The Mullard Company have now released some indirectly-heated rectifying valves which take approximately the same length of time before they begin emitting as do normal indirectly-heated receiving valves.

This immediately overcomes the trouble of voltage surges, removes the strain on the fixed condensers and obviates the use of delayed switching.

From tests we have made these valves appear to be entirely satisfactory and, in fact, a distinct improvement over the old directly-heated type. The hum level is distinctly lower.

As the cathode of these valves is connected internally, they are suitable for replacement in practically any type of set where a directly-heated valve is at present in use. The IW2 will undoubtedly be the most popular valve. A 4-volt heater at 1.2 amperes and with 250—0—250 volts r.m.s. will give 60 milliamperes. The IW3 gives 120 milliamperes with 350—0—350 volt r.m.s.

A special valve is the IW2A, designed to give almost perfect voltage regulation. This has a 4-volt heater, but at the current of 2.4 amperes, and will give 60 milliamperes with 250—0—250 volts r.m.s.

More Dial Alterations

TO enable users of H.M.V. and Columbia receivers to sort out the stations during the Lucerne Plan changes, special cards are being prepared by these companies.

These cards consist of a replica of the present station dial and a sketch of a dial based on the Lucerne Plan.

The card, which will be available free of charge from the dealer from whom the instrument was purchased, is only intended as a temporary measure. Later, when wavelength conditions may be considered to have settled down once more, new tuning-dial strips will be issued at a nominal charge.

Sets That Set A Standard.—I

The 1927 Ether Searcher

EVERY now and then a set is designed, built and published—and from the first day of its appearance before the wireless public its success is assured. Some sets are like that.

Looking back over the years AMATEUR WIRELESS has been designing and publishing wireless sets for constructors this truism about sets in general is once more emphasised.

Some sets, in this long vista of designs of every conceivable type, stand out head and shoulders above all others. It would seem that certain sets are pre-destined to set the standard for their year.

Back to the Year 1927

It is a far cry back to the year 1927. In November of that year the very first Ether Searcher set was designed. Alan Hunter did it, but even he would probably willingly admit that he had no thought of producing *the standard type of set for that year.*

Yet records prove that the first Ether Searcher was the set of the year 1927-8. Many hundreds of blueprints were sold, and dozens of letters poured into the editorial offices, all bearing witness to the success of this Ether Searcher.

Looking back on that set, we realise how useless it would be for present-day conditions. It had quite an elementary circuit, consisting of a detector valve with reaction, followed by a resistance-capacity-coupled stage, followed by a transformer-coupled power valve. No pentodes or screen-grid valves in those days!

Plug-in coils were used for tuning and reaction. The aerial was coupled to the grid-tuning coil of the detector by a small fixed condenser—even the pre-set type of condenser had not arrived.

Yet this simple set undoubtedly set a fashion in detector circuits; in circuits consisting of a detector and resistance-transformer coupling. It so happened that just that combination of valves gave enough volume to bring up foreigners to full loud-speaker strength, but not enough to overload the power valve.

Purity of Reproduction

Much of the purity of the resistance-capacity cum-transformer-coupled sequence, which succeeded the two-transformer sequence that had previously held sway was no doubt due to the avoidance of overloading.

Whatever the causes of its success, the first Ether Searcher set a standard. Down through the ensuing years there have been different Ether Searchers, improved Ether Searchers, in fact Ether Searchers so different from the original model as seemingly to have very little relation to it.

Yet all Ether Searchers have had this in common: they have set a standard for their year. The New Year of 1934 approaches and with it, well, another Ether Searcher—naturally. Be patient. It is coming soon.

Constructors of chassis sets will be interested in the new valve holders manufactured by Ferranti, Ltd. They are available in four-pin, five-pin and seven-pin types, and are provided with soldering tags so constructed that the flux cannot run into the sockets.

◆ ◆ ◆

An error occurred in the last sentence of the test report on the Ready Radio E.M. Plus 4 kit published on page 1083 of the last issue. It should have read: ". . . it will give results comparable to many commercial receivers at a *much higher* price."

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.

Special Cone Construction

LOUD-SPEAKERS to suit all requirements are manufactured by Nuvolion Electric, Ltd., and descriptions of all these loud-speakers are contained in a new list. An interesting point to note is the construction of the cones. A 14-lb. weight can be placed on the top of the speech coil without doing any harm to it. **110**

Car Radio Folder

Are you one of the more fortunate who own a car? If you are then you should write for this folder of car radio. The distributors of these sets are the Arvin Electric Co. One set is priced at £12 12s., being complete with suppressors for spark-plugs and distributor, remote control and loud-speaker. The output is 2.75 watts. **111**

Cossor Accessories

A new Cossor folder catalogue is devoted to radio accessories, including extension loud-speakers, pick-ups, high-tension batteries and accumulators. **112**

Every Constructor Requirement

Almost anything the constructor requires is contained in a comprehensive catalogue published by J. H. Taylor. It contains 120 pages of information, with a six-page section of bargains ranging in price from 3d. to 5s. It is impossible to list every component manufactured, but this firm can supply any materials advertised by the leading manufacturers. Truly a useful list to have on hand. **113**

Notes and Jottings

EVERY radio dealer should have a copy of the 1934 edition of *The Wireless and Gramophone Trader Year Book* (5s. 6d., post paid). This is the tenth successive year of publication and the issue just published contains many new and important features. The page size has been doubled and it is much more convenient in its new form for reference purposes.

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Full o' Power batteries, manufactured by Siemens Electric Lamps and Supplies, Ltd., now include two double-capacity batteries to fit the cabinets of the new Cossor receivers.

◆ ◆ ◆

From the land of skyscrapers and tall stories comes yet another "true" tale. An eminent American professor had a very brainy idea. He trained a powerful telescope upon Venus. The light that was received was then projected on to a photoelectric cell. This caused a current flow from the photoelectric cell sufficient to be fed into a powerful amplifier. It is said that the sound that issued from the loud-speaker was comparable with oriental music. Perhaps "unearthly" would be a better definition.

PREPAID ADVERTISEMENTS

Advertisements under this head are charged THREEPENCE PER WORD, minimum charge THREE SHILLINGS. DEPOSIT SYSTEM.

As the publishers cannot accept responsibility for the bona fides of advertisers in this publication, they have introduced a system of deposit which it is recommended should be adopted by readers when dealing with persons with whom they are unacquainted. It is here explained.

The amount of the Deposit and Fee must be remitted by Postal Order or Registered Letter (Cheques cannot be accepted), addressed to

"Amateur Wireless," Advertisement Department, 58/61 Fetter Lane, London, E.C.4.

PATENTS.—Trade Marks, "Advice Handbook" free.—B. T. King, Regd. Patent Agent, 146a Queen Victoria Street, London.

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