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SURPRISES AT RADIOLYMPIA

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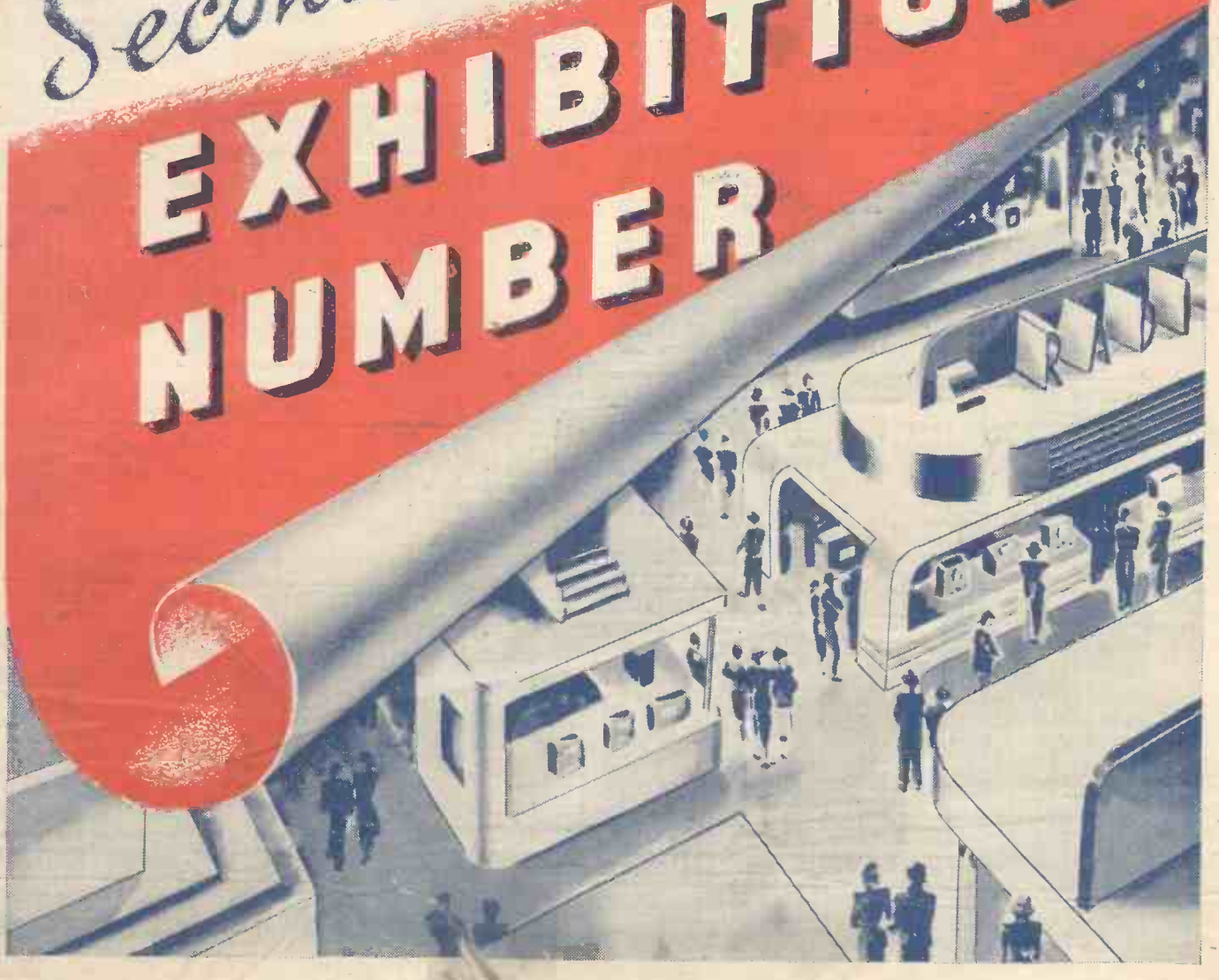

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G.P.O. EXHIBIT
"FLEA" POWER"
DUST AND SNOW

RADIO NOTES & NEWS

SNOWBALL PROGRESS
WIRED RADIO
NEW EXCUSE

Exhibition Highlights

BEFORE Olympia's greatest Radio Show closes down on September 4th millions of pounds' worth of orders for the next twelve months will have been placed with the radio trade.

More than 150 manufacturers are directly represented at Olympia, and over five miles of stands are used to display their wares.

Last year the attendance was 202,517—but that was when the all-wave fever was only beginning, and before arrangements had been made to show television adequately.

This year real television—the best in the world—can be seen easily, by everybody.

Bouquet for G.P.O.

ON the stands at Olympia about 1,500 people, who are on duty to meet the public, have more than five miles of stands to look after. The value of the Exhibition for insurance purposes is about £6,000,000.

So far as semi-official and official attractions are concerned I unhesitatingly award the palm, with knobs on, to the G.P.O. Stand.

Here experts in interference problems are engaged in *helping* the listener, which is a far, far better thing than badgering him to buy something or trying to impress him with set pieces.

I think it is time that somebody said, right out, that the G.P.O.'s idea of giving service—expert and first-rate service—to the listening public, is one of the best features of a great Show.

More "Flea-Power" Captures

HAVING seen the recent logs of "flea-power" radio stations captured by "J. W. C." and "G. L. S." in these Notes, a Staffordshire reader—W. M. G., of The Vicarage, Newhall, Burton-on-Trent—has consulted his log and now discloses that he holds a very pretty hand. His set is a five-valve superhet, with 30-ft. aerial suspended 20 feet from the ground. Most of the stations were heard after dark, but several were picked up in daylight.

His best catch was Alexandria (Egypt) on 267·4 metres, when it was using a power of 0·25 kw. For sheer weight of numbers his list, which I give below, is truly remarkable.

From Belgrade to Chatelineau

THE only station in "W. M. G's" list having a power of as much as 2·5 kw. is Belgrade, on 437·3 metres. The others, in descending order of wavelengths, were Fredrikstad, Pori, Sortavala, Agen, Rueil-Malmaison, Sofia, Limoges, Radio-Cité, Zagreb, Newcastle, Cork, Bilbao, Aberdeen, Dresden, Danzig, Magyarovar, Dublin, Salzburg, Notodden, L'Isle de France, Basle, Warsaw, Vaasa-Vasa, Kaiserlautern, Miskolc, Pecs, Bournemouth Nimes, Karlskrona and Chatelineau.

The last-named, Chatelineau (Belgium) has the lowest wavelength and lowest power, this being only 0·1 kw.

The average power of this splendid collection is well below 1 kilowatt. I hadn't realised that there were so many "fleas" in the whole of Europe!

My Word — By The Editor

A GOOD SHOW

And so the Radiolympia of 1937 pursues its successful course. On Saturday night all the brilliant neon lights will be turned off and the stands dismantled, and another Radio Exhibition will have come and gone.

It is a good show with grand attendances and more than usual for visitors to see. But we feel rather sorry for those who have come determined to choose their new sets. In such a confusion of first-class apparatus of more or less equal attractions the uninformed listener can only wander from point to point with his mind in a whirl.

He would be quite unable to appreciate the fact that behind differing cabinet designs and the disposal and forms of control, modern radio receivers have almost standardised similarities from make to make. That there are particular ways of doing certain things so much better than it is possible to do them other ways that they are adopted as standard practices.

Nevertheless, there are sufficient varieties of form and presentation and detail to make a survey of even a bunch of sets in the one price class an interesting diversion.

And some firms *do* make at least slightly better sets than others!

Address of American Pen-Pal

IMAGINE my surprise on getting a letter beginning "Dear Reverend." It came from Kansas, and the clergyman to whom it was originally addressed forwarded it to me in the hope that I could tell you fellows about it.

The address given at the top is 1210 North C., Wellington, Kansas, U.S.A., and the writer says, "I thought maybe you would be able to find some boy about my own age who would like to correspond with some boy in America.

"My name is Clifford Earl Martin, and I am 19 years of age. My hobbies are amateur radio and stamps. I am hoping to get a licence to operate an amateur transmitter in the future. Am planning to enter college next year."

Evidently the writer of this letter is something of an all-rounder, for he also announces in a postscript his intention of joining the college dance band.

I hope that one of my readers will accept this offer and get to know the enterprising young American.

Sidelight on Ole Man River

BEFORE leaving this subject I should like to say that Mr. Clifford Earl Martin is an interesting correspondent. Here is a brief extract from his letter which tells its own story:—

"I expect you read about the big flood caused by the raging Ohio and Mississippi rivers. Louisville (Kentucky) was then evacuated except for flood workers. Amateur radio was in full swing in the 9th and 10th districts. All other districts were asked to stay off the air.

"Out here in Kansas we had just the opposite for a week—dust storms. It got so dusty here that you couldn't see the radiator cap on your auto. Then all of a sudden, overnight, it got so cold that it snowed. The State highway police asked motorists not to travel by highway because of the snowdrifts on the roads."

That's what I call good, vivid letter-writing; if I had more time I should enjoy writing to this chap myself.

(*Continued overleaf.*)

NEXT WEEK: SPECIAL RADIOLYMPIA SURVEY

"WIRED WIRELESS" PROGRAMMES FOR GERMANY

He Earns £1,500 a Week

JACK BENNY, the U.S. radio and film star who has been holidaying in London, is one of the world's highest paid entertainers.

Jack, who has a poker face and caustic wit,' does not think that £1,500 a week for half-hour broadcasts is excessive remuneration.

"I earn a lot," he admits, "but taxes are so graduated in California that by the time you have met necessary expenses, and enjoyed the things you think you are entitled to you have just about as much money left as everybody else—no more."

You said it, Jack. For whether it's a nice little sweepstake or a society's "divvy," the extras always melt "like snow upon the desert's dusty face."

Still on the "Up and Up"

THE second half of any year is usually the more important as regards the number of licences issued, and in this respect 1937 has made a promising start with the July figures, just issued.

The statistical department of the G.P.O. —whose theme song is *It's a Sin to Tell a Lie*—states that the approximate number of wireless licences in force at the end of July last, was 8,269,500, as compared with 7,718,794 at the end of July, 1936.

The increase during the year was thus 550,706, which looks as though we have a long way to go to saturation point.

Snowball Progress

HAVE you ever noticed how the two great inventions of the twentieth century—radio and aviation—depend upon each other? And how progress in one of them reacts to improve the other, thus making possible still further progress?

The trans-polar flights by Soviet airman to California are good examples of this two-way benefit. Largely because of radio the airmen were able to break the world's long-distance record, which led to such interest in the flight that Moscow and New York were hitched up direct by radio-telephone. Now the Soviet authorities are negotiating to make the radio communications between Moscow and New York permanent. If they do so the improved radio service will be chiefly due to the aviation success.

Like the two crafty crocodiles, the latest scientific discoveries seem to say to one another, "If you'll scratch my back I'll scratch yours."

No Jamming, No Fading

IT is reported from Berlin that Germany has taken an important technical step —the broadcasting of "wired wireless" programmes. By means of a simple connection to the telephone wires the programme can be fed into the wireless set from the telephone lines, instead of from the aerial. In addition to the advantage of uniform strength of reception, no heterodyning and no monkey-chatter are possible by this method. And it has no effect upon the ordinary telephone business.

In this country P. P. Eckersley has proclaimed the practical advantages and championed the system for years. If the G.P.O. people took it up vigorously it might double the attractions of those telephones which they want the public to order from them.

"THE BELLE OF NEW YORK"

On similar lines to those adopted in his comic opera series, Gordon McConnel is to present "Songs From 'The Belle of New York'" in the National programme on September 15th, and on the Regional wavelength on September 17th. A compère will link together the book and the musical items.

"It is one of those quick-moving, colourful shows that defy radio adaptation," Mr. McConnel says. "The humour is mainly visual, and only television could revive the real glories of this great success of the late-nineties."

First produced in 1898 at the Shaftesbury Theatre, "The Belle of New York" introduced to London one of the most delightful of leading ladies—Edna May; and the piece ran for 697 performances. Revivals were staged in 1901, 1914, 1916 and 1919, and under the management of J. Bannister Howard, to whom the "Belle" seems like an adopted daughter, the show has toured the country until the present day. Twenty-five years ago he produced it in Paris, as he hopes to do again shortly.

The book was written by Hugh Morton, and Gustave Kerker composed the tuneful score.

"Hit numbers" to be included in the broadcast are: "Teach Me How To Kiss," "The Anti-Cigarette Society," "La Belle Parisienne," "They All Follow Me," "She is the Belle of New York," "When We are Married," "The Purity Brigade," and "On the Beach at Narragansett."

The compère will be Fred Duprez, well known to music-hall and theatrical audiences throughout the country as comedian and raconteur. Betty Huntley Wright, whose versatility has won her successes in such leading rôles as "Veronique," and also as principal boy in pantomime, will play the part of Fifi Fricot. Tessa Deane, heroine of "Derby Day" (another Gordon McConnel radio production), "A Southern Maid," and many other musical shows, will play Violet Gray, the Salvation Army girl who reforms the dissolute young man.

Where Every Man Carries Radio

THE extent to which radio has been pressed into service, east and west, by the war-makers, is not always apparent from our newspapers. In Shanghai and in Spain the actual fighting, flying, spotting and bombing are all largely radio-directed—perfect examples of Man's misuse of science.

Rumania is now reported to be carrying the matter to its logical conclusion; she is going to equip every man in her army with a portable radio set.

From the militarist point of view this may be an admirable move. From the plain home-loving citizen's point of view it is a damnable inversion of a great invention. Radio may be convertible into a powerful weapon, but rightly used it would be a greater force for peace.

A Thrilling Excuse

YOU would not expect praise for the B.B.C. programmes from a motorist in court for a driving offence, would you? Yet it was in such circumstances that the prettiest possible compliment was recently paid.

As is usual when a charge of speeding is preferred, the accused was given the chance of stating the extenuating circumstances, if any. And in this instance the accused said that he did not notice his speedometer reading because he was listening to a thriller on his car radio, and became too engrossed.

I don't know what the magistrate thought about this, but this testimonial has certainly elated the radio drama people at Broadcasting House.

Other People's Radio

BELGIUM has now established a system of labour exchanges throughout the country, and is adopting a novel radio arrangement by means of which all vacancies are broadcast daily at 9 a.m.

* * *

Shetland is to have a wireless beacon installed at the most northerly point of the Islands, to safeguard shipping in those waters.

* * *

Dublin had to borrow Rugby's time signal because of the discontinuance of time signals from Dunsink Observatory, so the "time ball" has been released by means of a radio-set at the Ballast Office.

Sing High, Sing Low

DID you take my tip and listen to the broadcast of Miss Ann de Ohla, the blue-eyed girl from Copenhagen who sings in either soprano, contralto, tenor or baritone?

On one occasion she used her amazing gift like a fairy godmother, to mend a broken romance. Two of her friends had fallen out, and Ann knew that the only bar to reconciliation was that neither wanted to be first to give way.

Ann brought both understanding and her stock of voices to play on the problem. She called up the girl and, speaking in a man's voice, said, "I'm sorry about yesterday." Then she called up the man and, speaking in her friend's silvery tones, "Sorry about yesterday. What about to-night?"

Each was so pleased to get the other back on the old footing that they were safely married before they discovered that Ann's spare voices had made up after their one and only quarrel.

ARIEL

Surprises at RADIOLYMPIA

NEW EKCO INNOVATION :: THE HARRIES ALL-STAGE VALVE :: MARCONIPHONE SETS WITH ENORMOUS WAVEBAND COVERAGE :: ELECTRON-COUPLED OUTPUT :: HIGH POWER OUTPUTS OF 1938 DESIGNS

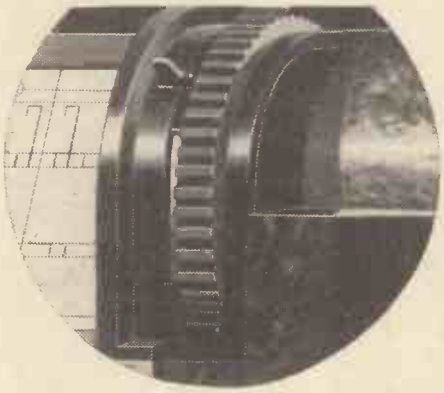
EACH year Radiolympia brings forth its little crop of surprises—innovations which manufacturers have kept "up their sleeves" until the opening of the Show; then to release them before our astonished eyes.

This year is no exception, and there are a number of outstanding developments which do great credit to the manufacturers concerned.

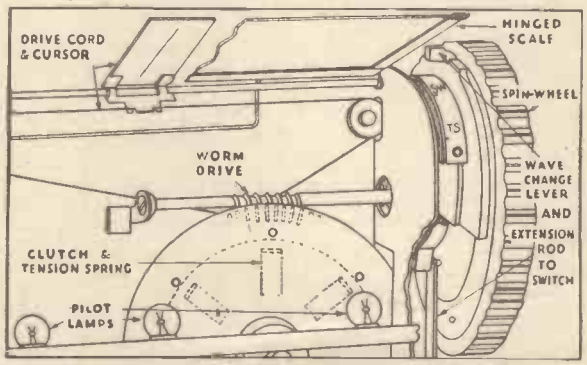
Take, for example, the new Ekco innovation of "Spin-wheel" tuning. For years we have come to regard knobs as being essential in the design of a radio set. In some cases the number of knobs has been reduced to one or two, but for all that we have learnt to look upon their use as being part and parcel of our sets.

And now Ekco have produced designs with no protruding knobs at all, the only controls visible on the cabinet being milled rims at the side of the tuning escutcheon. This new spin-wheel tuning is a fascinating and ingenious contrivance. Actually, you have a fly-wheel running on ball bearings which spins at the slightest touch. The large rim, which is 14 in. in circumference, travels nearly eight yards in taking the tuning indicator once across the scale. So it can easily be seen that accurate tuning is a very simple and sure business.

"SPIN-WHEEL" TUNING



The controls of the new Ekco receivers are visible only as milled rims following the curve of the cabinet. Knobs are eliminated entirely. The rim of the tuning control travels eight yards in moving the indicator once across the scale.



How the "spin-wheel" tuning mechanism works. The spin-wheel is counter-balanced for smooth running and rotates the worm-drive, engaging the machine-cut gear wheel. A friction clutch and tension spring transmit the movement to a disc connected to the spindle of the tuning-condenser and carrying the bearings for the drive-cord. The clutch prevents damage through overdrive. A wavechange switch, "on-off" volume control and tone-control are mounted on the same assembly, the switches operating through extension rods, as on right.

An Ingenious Device

On this page we show a sketch of the spin-wheel tuning mechanism from which the ingenuity of the device can be clearly seen. The milled wheel operates the tuning condenser through a worm drive, which engages with a toothed wheel. This toothed wheel drives the tuning condenser through a clutch arrangement, which provides perfectly smooth movement, free from backlash. As the condenser rotates it operates a cord which moves the cursor across the tuning scale.

By the side of the spin-wheel tuning control is the wavechange switch lever, and on-off switch, and the set can be switched on and tuned with one finger.

The whole scheme is very ingenious, and yet its very simplicity renders it fool-proof in operation

Another outstanding feature of this particular range of Ekco sets is the fact that the television sound wavelength is included in the tuning range, so that those who are within range of the Alexandra Palace transmitter can add yet another programme to the many from which they can choose with these fine sets.

Perhaps you will think that those receivers which are equipped with this new Ekco innovation of knobless control and television sound reception are sets in the higher price class. This is not the case, for you can purchase the A.W.88, which is an eight-stage superhet for A.C. mains, covering in addition to the 7-metre wave, the short-wave range of 16–50 metres, plus the normal medium and long wavebands, for 12½ guineas. Or if you require something more powerful, there is the A.W.98, a nine-stage superhet capable of giving as much as 6 watts undistorted output for 15½ guineas. These, we think you will agree, are excellent value.

Any-Stage Valve

Another undoubted surprise is the Hivac Harries all-stage valve. Here you have a special multi-grid critical distance valve, which you can use in any of the stages of a multi-valve receiver. Thus you may have a super-heterodyne using only one type of valve throughout. The valve is applicable to many specialised purposes and may be used either in transformer-fed A.C. receivers or in series-heater type universal mains instruments.

Already one of the oldest firms in the industry have incorporated this valve in their latest receiver. The valve is the result of four years' intensive work by Mr. Stephen P. de Laszlo, in

(*Continued overleaf.*)

SURPRISES AT RADIOLYMPIA

(*Continued from previous page.*)

co-operation with Mr. J. H. Harries, the inventor.

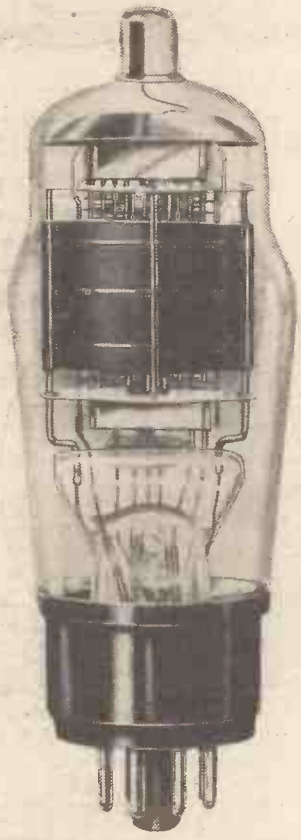
But these are by no means the only surprises at this year's Show. What about the Marconiphone ten-valve all-wave auto-radiogram superhet which tunes from 4·85 to 2,000 metres? Most people have always regarded reception on the ultra-shorts as something requiring a highly specialised receiver designed only for this class of reception. Yet here we have a commercial radiogram with automatic record-changing and every conceivable refinement that one can possibly desire, coupled with this remarkable waveband coverage. Naturally, such a receiver is in the de luxe class, and it costs 67 guineas. But for this you get in addition to the features already mentioned two high-fidelity loudspeakers and an output of over ten watts undistorted. It is really a lovely receiver, and is housed in a magnificent walnut cabinet of true period design.

Other Wide-Range Sets

But don't run away with the idea that this is the only model in the Marconiphone range giving this enormous waveband coverage.

You can get a similar chassis with the same waveband coverage in table-grand form—that is, without the automatic radiogram side and the elaborate cabinet—for 24 guineas. Or, if you prefer a console, there is one available for 32 guineas. Both of these sets have push-pull output giving ten to twelve watts of undistorted energy. So if you want a set that will give you, in addition to everything that is receivable on the short waves, American police cars and other fascinating signals, such as you get only round 10 metres and below, then one of these sets will be of more than passing interest to you.

If you want another surprise, take a look at the Burndept range. Here you will find the Model 259, priced at 18 guineas, and you have an electron-coupled output valve used for this first time in a broadcast receiver. The output is as much as five watts, and allied with this is the new Burndept development of Aural tuning, which automatically ensures that every station received is perfectly "on tune." The makers claim that nothing is left to the skill of the operator in this design, accurate tuning of a given station being automatic, and the receiver passing silently from one station to another as the dial is rotated, automatically eliminating stations that are not of programme value. This new Burndept model is, of course, of the all-wave type, and it is designed for A.C. mains working.



The new Hivac-Harries All-stage valve, type A15—the highlight of the Hivac display at Olympia. It works in any stage of a radio receiver.

Also, what about this question of output power? Have you noticed the terrific kick that the modern sets will give without distortion? Just have a look through some of the literature dealing with the various new models and notice their outputs. It surprises you, doesn't it? Up to 10 watts or more in certain cases. All of which shows the wonderful advances which have been made in 1938 receiver design. Gone are the days of output stage overloading—the new season's sets have an enormous margin of safety.

And lastly we come to television. It it is here, perhaps, that we find the biggest surprises of all. Cheaper television has definitely arrived. Thirty-five guineas is the price of one outfit! This is certainly an attempt to bring television within the reach of us all.

Then there are the new big-screen outfits giving pictures about four times the area of the normal receiver. Yes, there is no shortage of surprises at this year's Show.

TECHNICAL JOTTINGS

Items from a Radio Expert's Notebook

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

THE idea of using two speakers is always intriguing, and those experimenters and experts who have the patience and the inclination to go in for this kind of thing declare that you can never get the same result with one speaker. I suppose there is a good deal to be said for this. There are, as a matter of fact, some receivers on the market which actually incorporate two loudspeakers as standard practice.

Stereoscopic Effects

It is possible by suitable arrangements to get a kind of stereoscopic effect which, so far as it goes, makes the reproduction seem so much more realistic. The effect is not, however, truly comparable to the stereoscopic effect with vision because, as you probably know, in a stereoscope each of the two eyes looks at a separate picture and obtains the view which it would have obtained if looking direct at the original object. When you look at a pair of stereoscope photographs you think the two pictures are identical, but they are not absolutely identical; they differ, in fact, just that little bit that makes all the difference. When you look at any object with your two eyes open the right eye sees the object from a slightly different angle from the left eye, and consequently the two views are slightly different, but it is just that very slight difference that enables the brain to perceive the three-dimensional "solidity" of the objects looked at.

Realistic Reproduction

In the same way, if the reproduction could be so arranged that the right ear received a different sound from the left ear, each ear receiving the sound it would have received if you had been listening to the original sound direct, then you would get something truly comparable with stereoscopic vision. But inasmuch as the sound all has to come via the one channel, you don't really get this effect even with two separate loudspeakers placed in different positions. You do, however, get something which the ear, by dint of a certain amount perhaps of unconscious imagination, makes up into a more realistic impression than that derived from a single speaker.

Future Trend

Personally I think the idea of dual or treble speakers is one which is worth a good deal of further exploration, and I have no doubt that in the future you will find that this will be one of the lines along which research will be pursued. So much has already been done with regard to the microphone and *transmission* phases of radio broadcasting that it seems time now to think more in terms of the actual *reproduction*.

Aerial Selectivity

If you are using a fairly large aerial you may find that this will reduce the selectivity of your set and prevent you from getting a large number of stations, particularly distant ones. It is quite common for this to be the case when the set has only one tuned stage, and I have known it to happen even with a set with two tuned stages.

(*Please turn to page* 643.)

An ALL-WAVE EXHIBITION

It is amazing the strides which short-wave reception has made. Contrast the modern single-knob set bringing in America like a local, with the old-time headphone skeleton set. And read what the Show has to offer in simplified all-wave reception.

WHEN POPULAR WIRELESS produced the very first all-wave set, the response was remarkable. There will probably be very many readers of this journal who still remember the furore occasioned by the "Magic" Three. It was a design for home constructors, and there never was and never will be any means of ascertaining exactly the number of people who built that set. It was probably in excess, though to what extent cannot even be hazarded, of a quarter of a million.

Standard components which were used in standard designs were so much in demand for the "Magic" that stocks all over the country were wiped right out. An inexpensive but rather special component for this super-popular set was sold to the tune of over one hundred thousand by one firm alone. Small "pirate" workshops all over the British Isles had the time of their lives cashing in on the "Magic" boom.

But that was the very first time that it became possible for listeners to tune-in the world's programmes on a simple radio receiver that was also suitable for medium- and long-wave listening. The novelty appeal of the instrument was tremendous, but it must be remembered that this was in the days when many people still considered it wonderful if they could hear a near-by radio station faintly and considerably distorted.

To-day broadcasting is a familiar social amenity. No surprise or wonder is evinced when anyone is told that So-and-so can "hear America" on his set. It is not greeted as a miracle, but rather as a matter of course if the set used is describable by that now familiar term "all-waver."

The short waves, for long the secluded preserves of the more advanced radio experimenter, have now been tamed for listeners and embodied in inexpensive commercial sets as successfully as the other wavebands.

We must admit that it did not appear possible that this could be done at one time, and it would not have been were it not for considerable technical advances and tremendously important developments in mass-production methods of radio set manufacture.

A G.E.C. RADIOGRAM

The G.E.C. A.C. Fidelity All-wave 8, which has an automatic record-changer.

Yesterday and To-day

Picture short-wave reception of yesterday and to-day. In the one case a shirt-sleeved amateur wearing headphones and operating a number of delicate controls on a skeletonised, weird-looking series of units. The hour is three o'clock in the morning, and the house is so quiet that you can hear a clock ticking downstairs. Yet he listens with strained intentness endeavouring to wring faint whispers out of the night ether. And to-day. Eight o'clock in the evening. Five people in the parlour all talking. One drops out of the discussion and wanders over to a glistening walnut and chromium radio. He casually turns one knob and very loud dance music bursts forth from the moving-coil speaker. "That Henry Hall on the Regional?" asks someone languidly. "No, it's Schenectady; Red Nichols' Band, I think," is the reply delivered in very matter-of-fact tones.

And that's not an overdrawn picture, either. Modern all-wave sets *are* as easy to handle as that, and short-wave stations *do* come over with the power of B.B.C. transmitters. All the conditions have been changed.

FROM 11 to 2,000 METRES

Costing 19 guineas, this is the Marconiphone four-band eight-valve A.C. superhet table grand.

Short-wave stations now use great power, some of them more than national medium and long-wavers, and they employ directional aerials. The Americans have large numbers of directional short-wave antennas directed towards Europe. They also have them directed towards South America, Canada, and other places, and switch round among these as with the suitable hours for listening to their programmes in the various countries.

For example, Bound Brook is generally directional for Western Europe up to about eleven o'clock, after which they turn their attention to another quarter of the globe.

Italy, Russia, and others use this directional scheme, as also does our own Empire short-wave service. The time has passed when the only short-wave programmes worth listening to were to be picked up in the early hours of the morning. There are strong signals in the ether throughout the whole of the twenty-four hours except

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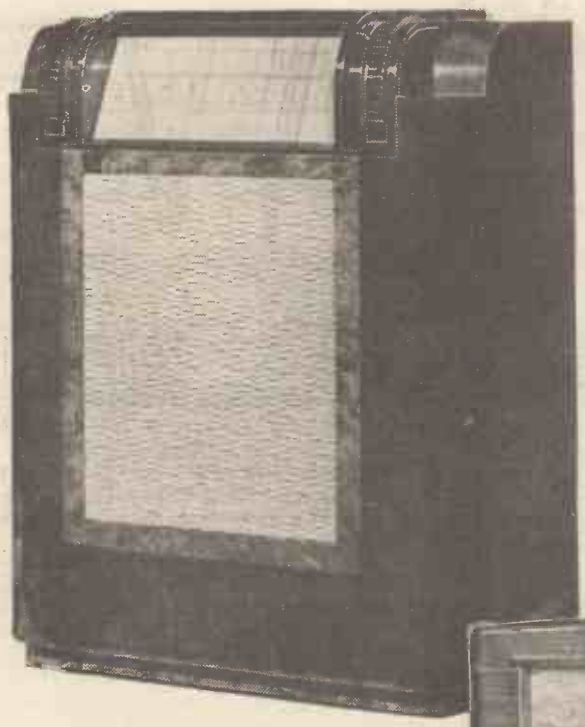


This Ekco All-Wave A.C. superhet has "Spin-wheel" tuning and built-in controls.

during those periods of poor conditions. Sun spots and all that!

But, even so, there are the B.B.C. Empire stations often to be heard at good quality, though you aren't supposed, theoretically, to be able to hear undistorted signals at consistent strength if you are in the same country as the short-wave station.

As for the sets, Radiolympia clearly proves that progress there has been just as great. A large proportion of the all-wavers are superhets, and these do not have tricky reaction adjustments to be juggled with, and extremely fussy "silent-point" tuning. The one main tuning knob serves all three wavebands, and the only difference that is noticeable in tuning a short-wave station is that sometimes this one tuning knob has to be turned rather more carefully. Not always even that.

Simplifying the Tuning

On many of the sets there are cunning compromises between the kind of gear ratio needed between the knob and the condensers it drives to enable you to sweep reasonably quickly from one end of the dial to the other, and the ratio required to slow down the movements of the vanes so that there is nothing very critical in the tuning of short-wave stations.

Other sets are equipped with two-speed controls, one speed for medium and long waves, and the other for short waves or for general fine tuning. Such a refinement puts short waves on a par with ordinary broadcasting in so far as the operation of the set is concerned.

When we come to the dials themselves we find much that is very interesting indeed. Practically all of them are coloured so that you can at once identify the waveband you happen to switch over to. A further refinement often to be seen is a complementary coloured switch indicator that leaves no room for doubt as to where you are.

But the calibration of short-wave stations is still no elementary problem easy of solution by simple means. There are so many of them! Taking a selection of the more popular and more consistently well-received medium- and long-wave stations of the two hundred or so in Europe that lie within the power of the average set creates no great difficulty. In any case, they are fairly well spread out over the whole of the dial in some sort of ordered plan.

In Little Patches

This does not apply to the short-wave stations. These group themselves in little patches on the dial, other and longer patches being left free for commercial stations. In the same kind of dial space as will contain only three or four medium-wavers, or perhaps only one long waver, you may have dozens of short-wavers.

One of the K.B. all-wave mains sets is shown above. It is available in A.C. or universal models.

And some that predominate in strength one day will be among the weakest the next day as with changing ether conditions. And this often quite irrespective of distances.

Clearly, ordinary and straightforward methods of calibration by station names or even frequency are not possible. Normally, the most that can be done is to print little bars of colouring on the dial and say, in effect, if you tune up and down this patch you will encounter all those short-wave broadcasting stations that lie in the neighbourhood of, say, 20 metres.

Automatic Volume Control

It is then left to the listener to do a bit of searching to locate stations and identify them himself. Not that he will have much difficulty in dealing with certain of the more powerful ones that come over well.

But Radiolympia reveals one or two improvements on this kind of thing. By means of slow-motion controls and magnified dial indication a few of the sets give you a quite microscopic reference.

Automatic Volume Control comes right into its own with the all-waver. This A.V.C., as it is more familiarly styled, is useful enough on the medium waves after darkness has fallen and fading sets in. But on the short waves it becomes almost invaluable. Modern, advanced forms of A.V.C. will maintain a fair consistency of volume even against high-speed fading or when the signal fluctuates very widely.

There may be those who think that highly efficient short-wave reception is still not possible unless one uses special apparatus with delicate controls. They can at once disabuse their minds of that.

Nowadays, valves are designed with the short waves well in mind—and components, too, for that matter. So much so that the majority of the 1938 all-wavers reach an amazingly high standard of efficiency

(*Please turn to cover iii.*)

AT YOUR SERVICE!

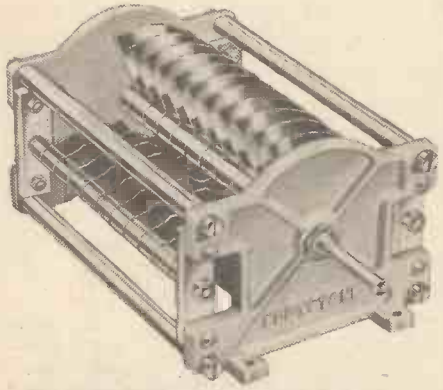
To the right is an H.M.V. Armchair receiver. It is a 10-valve all-wave mains receiver and has two loud-speakers.

COMPONENT and ACCESSORY ADVANCES

Considerable progress has been made during the past year in component design. Constructors are in the happy position of having a wide selection of high-efficiency parts to choose from, and those who visit Olympia are able to see and examine them for themselves.

EACH year brings a further increase of knowledge in the science of radio, and this is reflected in the component and accessory developments which are to be seen at the Twelfth National Radio Exhibition at Olympia.

Perhaps many of those who visit the Show and walk round inspecting the stands do not realise the enormous amount of research which goes on behind the scenes



One of the Eddystone transmitting condensers. Ceramic insulation is fitted in the high-voltage types.

in the factories and laboratories of the various manufacturers with a view to effecting still further improvements in radio reception.

The average constructor and listener tends to take these things very much for granted ; but, even so, he reaps the benefit in the steadily increasing efficiency of the various component parts which go to make up his receiver.

This year is outstanding for its all-wave aspect. The whole trend of development is in the direction of short-wave entertainment.

The Short-Wave Trend

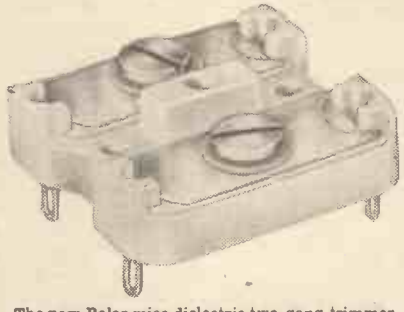
There was a time when the man who could boast of having received America was looked upon as somebody rather clever, and his efforts at receiving transatlantic programmes were not always particularly brilliant. To-day a much greater knowledge of coil and condenser manufacture, with its subsequent reduction of efficiency loss, coupled with improved valves and other vital parts, has made the tuning-in of these long-distance short-wave transmissions comparatively commonplace.

At Radiolympia there are several interesting new coil designs. There is, for example, the new J.B. " Linacore " tuner, in its all-wave form. This unit, which consists of a complete coil and condenser assembly, renders the construction of an all-wave receiver a simple matter.

Wearite's are showing a " Triogen " three-range coil covering three wavebands, namely, the normal broadcast bands and the short waves from 19–48 metres. It has a wavechange switch incorporated, also built-in trimmers, so that it can be ganged up to a ·0005 condenser assembly with the knowledge that accurate matching can be readily achieved.

Then there is the new Varley two-gang three-band superhet coil unit. This covers 17–50 metres on the short waves, in addition to the normal broadcast bands, and comprises aerial and oscillator coils, together with the necessary trimming and padding condensers. It is used in conjunction with an ordinary two-gang condenser.

NEW "POLAR" TRIMMER



The new Polar mica dielectric two-gang trimmer. It has a Ceramic base and is available in various capacities.

Bulgin's have an entirely new five-range coil unit which, in addition to the short, medium and long wavebands, covers also the television wavelength, the tuning range extending from 5 to 2,000 metres in five steps. It is supplied complete with self-contained wavechange switch and all trimming condensers.

We predict with some confidence that in the coming year there will be a gradual tendency to move downwards in wavelength in set design, chiefly so as to embrace the television sound transmissions. Although television is at the moment confined to an area round London, there is no doubt whatever but that this area will be extended in the future, and so we shall have listeners taking advantage of this new source of entertainment, even though they may not have the necessary television apparatus for " seeing " as well as hearing programmes.

Another direction in which there have been considerable advances is in loudspeaker design. Loudspeaker manufacturers are never content to rest upon their laurels. In any case, the competitive spirit which exists between the different firms is sufficient in itself to ensure progress. Apart from better fidelity, one must remember the increased sensitivity of the loudspeaker of to-day.

New Speaker Designs

Special magnetic alloys are used in the construction of the latest speakers, these alloys giving an exceptionally high flux density, and thus greater sensitivity. The moving-coil speaker has now become a very reliable job. All vital parts, for instance, are dust-proof and moisture-proof, and the possibility of getting dust or small particles of metal between the magnet poles is very remote. The methods of centring employed provide exceptional accuracy, and this accuracy is surprising when it is realised how small is the air gap in which the coil has to move.

In the W.B. range the new " Planaflex " design is especially interesting. This particular speaker, which is intended only for use with quality amplifiers, has, it is claimed, an almost linear response with full output between 30 cycles and 14 kilocycles.

(Continued overleaf.)

A Goodmans high-fidelity moving-coil chassis speaker.

COMPONENT AND ACCESSORY ADVANCES

(*Continued from previous page.*)

The extension speaker is getting more popular than ever, and this is only to be expected; for the average listener has a dislike to being tied down to one room. On the extension system he can, if he wishes, have a speaker in every room in the house, although most people use only one, or in some cases two, extension speakers.

Two wire-ended resistors from the Dubilier range. These fixed resistances are very convenient and simplify set wiring.

One drawback with the average extension speaker is the fact that switching the set on and off must be done at the set itself, but this is not so if the W.B. "Long Arm" remote control is fitted. With this handy and ingenious device the listener can operate the set's on-off switch from the extension point, which is a definite advantage, especially when the extension point is in an upstairs room.

Goodman's have a couple of high-fidelity speakers, one a 10-in. and the other a 12-in. model. In each case the frequency response claimed is 50–12,000 cycles, and the smaller speaker can handle a peak output of 6 watts, whereas the larger one has a power-handling capacity up to as much as 12 watts.

For Battery Users

The battery user has not been forgotten at this year's Show. There is a very large number of listeners who, even in these enlightened days, are without the advantages of mains electricity supply. Naturally, this class of listener depends upon accumulators and dry batteries for his power, and he looks for the longest life from his dry batteries, coupled with a high degree of reliability in the case of his L.T. supply.

In connection with the L.T. some sort of visible change indicator is a great safeguard against under-charging and neglect. Such a fitting invariably means longer life to the battery, and, apart from this, the user always knows the exact condition of the cell. Exide's produced their well-known "Hycap" accumulators especially for those with little or no knowledge of L.T. accumulators. Also, in the Fuller Accumulator Company's range there is an excellent selection of radio accumulators of both the unspillable and ordinary type.

Improved Dry Batteries

Dry batteries have, of course, been improved, in so far as their internal construction is concerned. They not only give very good service, but with the reputable makes there are none of those annoying crackles and other troubles caused by faulty manufacture or inherent technical faults. The range of sizes to select from is a very wide one, and those with commercial sets will find that firms such as Drydex, Fullers, Pertrix and Aerialite can supply them with the particular type which is especially suitable for their set.

So far we have said nothing about condensers, and these, together with resistances, are vital components. There are, of course, two types of condenser, namely, the variable and fixed. Variable condensers never give trouble these days; their losses are negligible owing to the use of high efficiency insulating materials. Moreover, exceptional rigidity and smooth working is now a regular feature. Excellent examples are to be found in the Polar and J.B. ranges, as well as in the Eddystone range, where the short-wave enthusiast is catered for in particular.

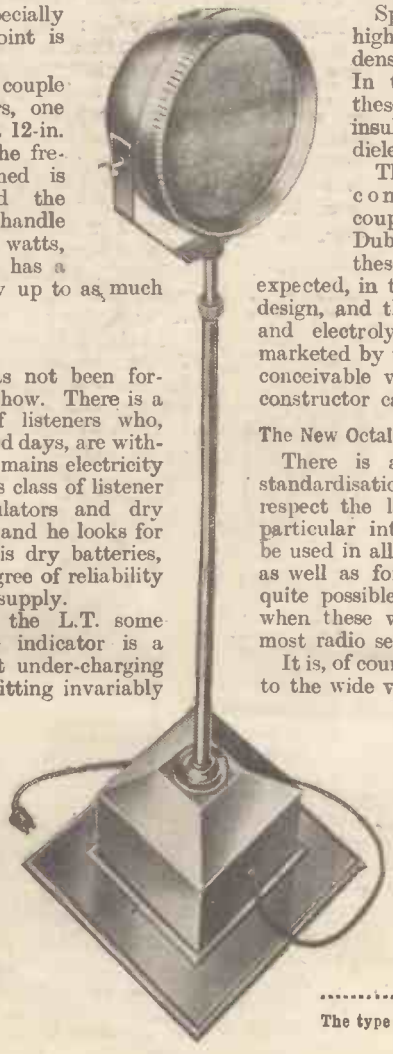
Speaking of Eddystone, their high quality transmitting condensers must not be forgotten. In the higher voltage types these are fitted with ceramic insulation, and in all cases dielectric losses are low.

The manufacture of fixed condensers is naturally coupled with the names of Dubilier and T.C.C. Both these firms are, as is to be expected, in the forefront of condenser design, and the ranges of mica, paper and electrolytic types of condensers marketed by these firms embrace every conceivable value and rating that the constructor can possibly require.

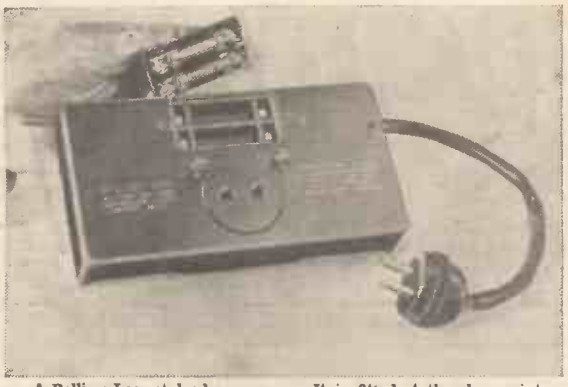
The New Octal Valves

There is a tendency towards the standardisation of valves, and in this respect the latest Octal valves are of particular interest. These valves can be used in all types of mains receivers, as well as for car radio sets, and it is quite possible that the time will come when these will be made standard in most radio sets.

It is, of course, impossible to do justice to the wide variety of new components and accessories displayed at this year's Radiolympia. We can, unfortunately, only skate over the surface, as it were, but there is one subject which is of marked importance to thousands of radio enthusiasts, and that is the suppression of man-made static.



The type 38T pedestal loudspeaker made by W. B.

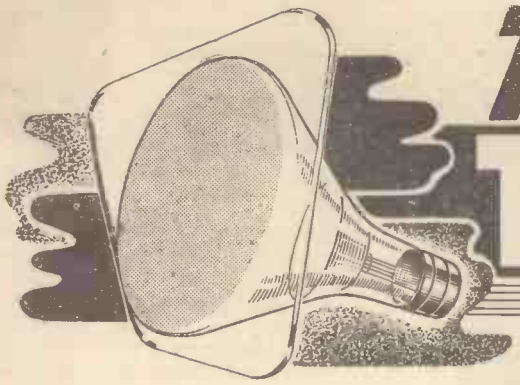


A Belling-Lee set lead suppressor. It is fitted at the plug point supplying any mains receiver and ensures that no conducted interference gets through.

Electrical interference is, if anything, on the increase owing to the daily increasing number of electrical devices brought into use. Those who visit Radiolympia, and who are troubled with electrical interference, would do well to visit Messrs. Belling & Lee's stand, and there seek advice from a firm which has specialised in the elimination of this trouble.

There are suppressors for every form of electrical interference. Incidentally, on this stand there is to be seen a special noise locator which comprises a sensitive portable receiver fitted with a search coil and phones. One of these is used by each Belling-Lee suppression engineer when searching for the source of interference. This is the first time that such apparatus has been exhibited at Olympia on the stand of a private firm.

One of the special Fuller radio accumulators. Note the neat carrying handle.



THE TELEVISION SETS

Full Details of Instruments to be Seen at the Show

By A. S. CLARK

BAIRD TELEVISION, LTD. Four models—T11 with all-wave receiver, price 70g.; T12 with all-wave receiver but larger picture than T11, price 85g.; T13 with all-wave receiver and automatic-record-changer gramophone, price 130g.; and T5c, price 47g.

Taking the complete television receivers on show at Olympia in alphabetical order, we come first to the Baird instruments, just as Baird's came first in the television world. The four models constitute an entirely new range of models, and the "Cathovisor" cathode-ray tube used in each case is completely electro-magnetic in operation. (That is to say, both focusing and scanning operations are produced electro-magnetically as opposed to the electro-static method.)

In the T11 model a black and white picture 10 × 8 in. is produced on a 12-in. diameter screen. The tube is mounted horizontally and viewed direct, and the picture is bright enough to be viewed either in daylight or ordinary room lighting.

Picture brightness and contrast are the only television controls normally to be used. The front panel of the cabinet hinges out to give access to the controls of the all-wave radio receiver which covers from 16·1 to 51 metres on the short waves. Automatic interference suppression is incorporated on both sound and vision.

THE BAIRD T11

Access to the all-wave-radio controls on this Baird instrument is obtained by tilting the front panel as shown.

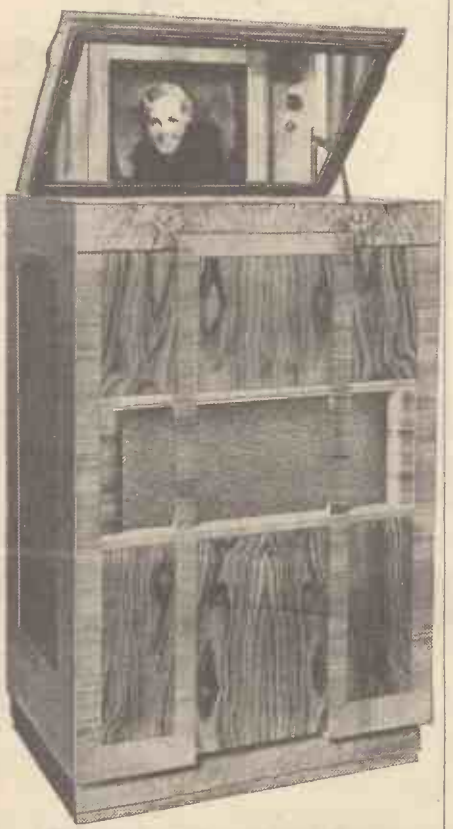
In the T12 model a black and white picture, 13½ × 10¾ in., is provided and is viewed in the part-mirrored lid of the cabinet, the tube being vertically mounted to one side. A knob for occasional adjustment of picture focus as well as knobs for picture contrast and brightness are provided.

The short-wave range of the 8-watts-output superhet receiver is 16·5 to 51 metres.

The T13 model is on similar lines to the T12 with the same size picture, but with a Collaro automatic-record-changer, which will play nine records of any size in any order desired. A crystal pick-up is employed.

The cabinet can be made in any wood to harmonise with existing furnishing. T5c is one of last year's models continued at a reduced price.

BY MARCONIPHONE



A 60-guinea instrument—Model 702—for vision and television sound.

BRITISH TELEVISION SUPPLIES, LTD. One model. This is for home-construction. Price for complete kit 55 guineas.

All radio constructors who have wondered whether they could tackle the building of a complete television receiver have their answer in this B.T.S. kit of parts. The results obtainable from the completed outfit are stated to be every bit as good as those from a complete commercial television receiver.

The instrument is built up in units, and a kit of parts is available for each unit. These may be purchased separately if desired, so that the constructor may build as means permit.

The assembly work is made as simple as the building of any straightforward ordinary radio receiver. And to facilitate wiring, special condenser and resistance panels, ready wired, are supplied where required.

There are five units to the complete assembly. First there is the sound and vision receiver, the kit for which is £6 17s., the cost of the 14 valves being additional. The time-base unit carries the cathode-ray tube, and the kit is £7 15s., valves and tube again being additional. Then there are three power packs, one being for tube excitation, one for the receiver and one for the time-base. These are, respectively, for the kits, £4 17s. 6d., £4 and £4 10s. including all rectifiers.

Each kit includes a full-size blue print, theoretical circuit and instructions for assembly, adjustment and operation. A metal frame to carry all the various units is priced at 27s. 6d.

A. C. COSSOR, LTD. Two models (at time of going to press)—137T with radio receiver, price 70 guineas; 237T with radio receiver and automatic-record-changing gramophone, price 90 guineas.

At present there are two models of Cossor television receivers, both of which are similar from the point of view of television and radio reception. The 237T model has an additional upper section to the cabinet of the 137T, which incorporates an electric gramophone of the latest type, with record-changer and every up-to-date development.

The prices include the cost of television

(*Continued overleaf.*)

(*Continued from previous page.*)

THE TELEVISION SETS

aerial equipment and maintenance for twelve months.

The picture is viewed direct on the end of the cathode-ray tube, which is enclosed by doors when not in use. Doors also enclose the controls when the instrument is not in operation.

The radio-receiver part of the instrument covers medium and long waves, and it is possible to have the television sound on without the vision should this be desired. There are only two controls in addition to those normally used for radio reception. One is to regulate the "brightness" of the picture, while the other determines the degree of contrast. Once set these do not require altering during the course of a transmission.

Electrostatic scanning and focusing are employed in the Cossor cathode-ray tube that is incorporated. Tuning to the television wave is done by means of an oscillator trimmer. When this is properly set for the television sound, the vision will also be correctly tuned. The instruments are for A.C. mains between 200 and 250 volts.

FERRANTI, LTD. One model for television and television sound only, price 70 guineas.

The Ferranti instrument has a directly viewed cathode-ray tube on which a daylight white and black picture 11¼ × 9 in. is obtained. The tube employs magnetic scanning and focusing and gives a very bright picture. The tube is 15 in. in diameter.

The instrument is designed for use on 200- to 250-volt A.C. mains of 50 cycles and consumes 330 volt-amps. There are 18 valves in the chassis and the sound output is 2½ watts. The tube is protected by safety glass.

There are eight controls as follows: Tuning, Volume, Bias, Contrast, Horizontal Hold, Vertical Hold, Focus and On-Off. The tuning control automatically tunes-in the vision and the controls do not require to be reset after having once been adjusted.

These eight controls are arranged in two vertical rows of four on the front of the cabinet, and two folding panels conceal them when the instrument is not in use.

A view of the new Ferranti television instrument. The controls are visible at the sides of the cabinet front.

THE GENERAL ELECTRIC CO., LTD. Two models BT3701, for television, sound, and pictures only. Price 60 guineas. Table model, price 35 guineas.

Although at the time of going to press we have full details of only one of the two G.E.C. television receivers, we learn that a new model of rather special design has been introduced to coincide with the opening of the Show.

The BT3701 model is an inexpensive instrument for the television programmes alone, i.e. the sound and vision programmes from Alexandra Palace. It is an ideal instrument for those who are already satisfied with the ordinary radio results given by their present radio receivers.

In the television receiver made by Haynes Radio, the side sections of the cabinet contain the all-wave radio set and gramophone equipment.

MADE BY HAYNES

A superhet circuit is employed and there are 23 valves in the instrument. The picture is viewed direct on the end of the 12-in. wide cathode-ray tube on which a black and white picture 10 × 8 in. is built up. Tuning adjustments are made on the sound which results in the vision being automatically correctly adjusted.

The mains range of the instrument is 190 to 250 volts A.C. at 40/100 cycles.

The table model with picture about 6 in. × 4 in. is announced as we go to press. It uses any existing receiver for the sound reproduction.

HAYNES RADIO, LTD. One model, the "Viceiver," with radio receiver and electric gramophone, price 120 guineas.

The radio incorporated in the Haynes "Viceiver" covers the medium and long wavebands. Direct viewing of the cathode-ray tube is adopted. The cabinet is built in three sections, the side compartments carrying gramophone and radio equipment and being of less depth than the centre section which houses the cathode-ray tube apparatus and loudspeaker.

The cathode-ray tube has a 12-in. diameter screen and is scanned magnetically. The twelve-valve vision and synchronising receiver is totally enclosed in an entirely screened unit and has a single limited range tuning control.

The time-base unit is of low-voltage type so that the valves are all working under normal rated conditions. Either a 6- or 14-watt output amplifier for sound may be incorporated.

The television part of the instrument is available separately if desired.

A general view of a Cossor television instrument in which direct viewing of the picture on the end of the tube is adopted.

THE GRAMOPHONE CO., LTD. Three models—901 for television, sound and pictures only, price 60 guineas; 900 with all-wave receiver, price 80 guineas; 902 with all-wave receiver and record-changing gramophone, price 120 guineas.

The H.M.V. television receivers really

(*Please turn to page* 628.)

ONE OF THE H.M.V. RECEIVERS

To the right is the H.M.V. Model 900 instrument, which incorporates a 6-valve all-wave radio receiver.

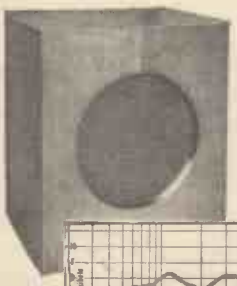
NEWS

FOR 'FIDELITY FANS'

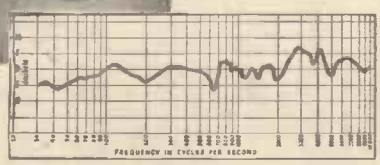
Planoflex

NEW SPEAKER FOR 'QUALITY SPECIAL' SETS

30 cycles to 14 kilocycles—the widest range of frequencies yet covered by a speaker of "domestic" proportions—this new W.B. product covers the band without departing more than a few decibels from the datum line anywhere. BUT—you must have a very high quality special receiver to operate it. Particulars of a suitable set, capable of assembly at reasonable cost, are included with each speaker. For those who can only enjoy the sort of radio which is hardly distinguishable from a personal performance, this new speaker and its set will open up new prospects.



30 cycles to 14 kilocycles



The new Planoflex speaker for special "local-station" sets will make a stir among technicians. Price **£5 5s. 0d.**

RADIOLYMPIA, STAND 75

Shows these and other items

Stentorian ALL-WAVE SETS!

For those who buy 'ready-made' radio

For listeners who listen carefully, but have no time to build the sort of set they like, this new range of sets is marketed.

Although not special "one station" receivers—on the contrary they have world-wide range—their quality of reproduction is well ahead of normal standards.

Prices are extremely moderate, as will be seen on examination—All-Wave Superhet, 9½ gns., for A.C. operation, 8 gns. for battery operation (less batteries); All-Wave A.C. "straight" 4-valve receiver, 8 gns. Self-contained battery sets, 7½ gns. and 6 gns. respectively, including full-size batteries. Attractive H.P. terms are available on all.

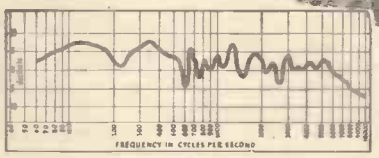
Fidelity & Precision

The makers, in their determination to maintain high quality and precision workmanship, are deliberately restricting output irrespective of demand. There will, however, be enough Stentorian sets to provide stocks for many good dealers.

FOR NORMAL RECEIVERS

Modified Stentorian brings increased fidelity

The New Stentorian and its response curve



Any improvement on the well-known Stentorian's amazing ability to "straighten" a long-range set's output curve has by many been considered unlikely. That feat has, however, been achieved this year in an unmistakable manner—as a few minutes' listening will show you. Prices remain extremely reasonable.

Senior (Type 38S)	-	42/-
Junior (Type 38J)	-	32/6d.
Baby (Type 38B)	-	23/6d.
Midget (Type 38M)	-	17/6d.

The first three are also available in handsome cabinets; Senior and Junior cabinet models also incorporate distortionless constant impedance, volume controls and button switches for "Long Arm" remote switching. Your dealer will gladly show them.

HIGH PRAISE FROM WELL-KNOWN EXPERT

Mr. Dowding, the well-known editor of "Popular Wireless," has expressed the following opinion:—"Listeners meeting this latest expression of W.B. quality will be thrilled by its clear expressive bass and crystal clear top notes. The speaker (Senior, 42/-) gives a realism which must be heard to be believed.

Advt. of Whiteley Electrical Radio Co., Ltd. (Information Dept.), Mansfield, Notts

THE TELEVISION SETS

(*Continued from page* 626.)

need no introduction to readers, being of the same high-class workmanship and giving the excellent results for which all H.M.V. products are now world-famous.

All three of the models give the same size picture, which is approximately 10-in. wide by 8-in. high. The pictures are exceptionally clear, brilliant, and steady. The radio receivers in Models 900 and 902 are six-valve superhets with an all-world range provided by the five wavebands covered.

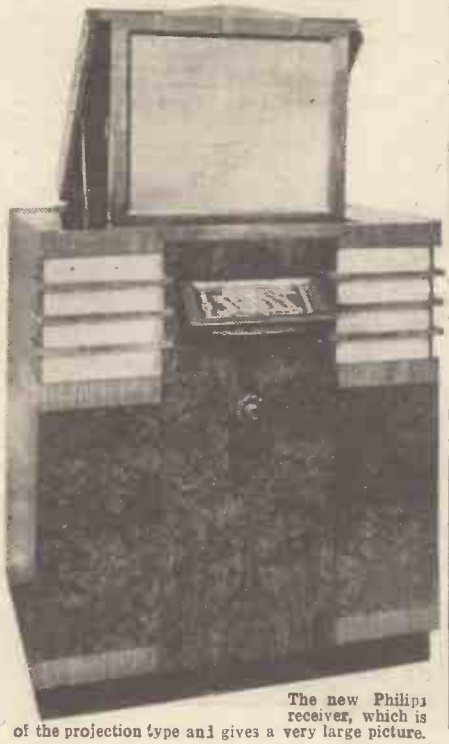
The record-changer in the case of the Model 902 is one which will take eight records. The prices include television aerials.

A big-screen set is used in the demonstration theatre and no doubt will be included in the production models.

This attractive Pye set incorporates a six-valve all-wave receiver.

THE MARCONIPHONE CO., LTD. Three models — 701 with all-wave receiver, price 80 guineas; 702 for television, sound and vision only, price 60 guineas; 703 with all-wave receiver and record-changing gramophone, price 120 guineas.

Simplicity of operation is featured by Marconiphone in connection with their television receivers, and with electricity at ½d. a unit Models 701 and 702 are stated to give eight hours' service for one penny. In all instances the picture is indirectly viewed in a mirror in the lid of the cabinet, thus giving a wide range of viewing angles.



The new Philips receiver, which is of the projection type and gives a very large picture.

Apart from the extra all-wave receiver in the case of Model 701, the following technical details apply to both Models 701 and 702.

There are five units in the complete chassis. They are as follows: Emiscope tube unit, the picture receiver unit which, it is interesting to note, is of the tuned-radio-frequency type instead of the more common superhet circuit, the synchronising unit, the power pack unit and the sound receiver. In the case of Model 701 this has four bands apart from the television sound. The wavelengths covered are 16·7 to 53 metres, 46 to 141 metres, and the usual medium and long waves.

Although the picture size is approximately the same size in both instruments, in the case of Model 701 a smaller tube is employed and the picture size increased by magnification by means of a viewing lens.

The television controls provided are five in number, but it must be appreciated that they do not necessarily require touching each time the instrument is switched on. They enable the fullest life to be obtained from the cathode-ray tube consistent with satisfactory pictures and provide a high degree of control "flexibility." They are line hold control, frame hold control, sensitivity control, contrast control, and brightness control.

The Model 703 television receiver is known as the Marconiphone "Mastergram" and is a complete electrical and radio home entertainer.

The receiver portion is a six-valve four-waveband unit.

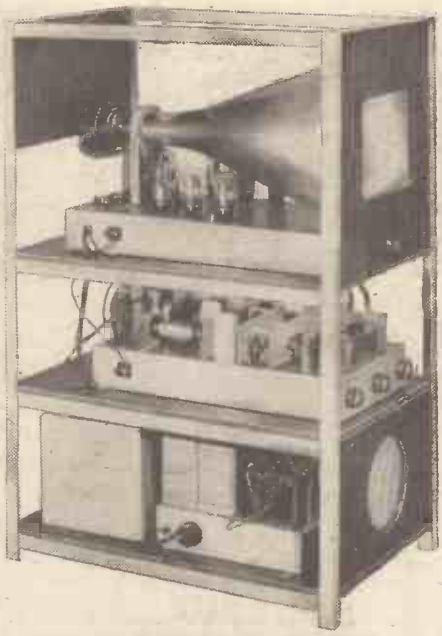
Demonstrations of a big-screen set are also being given, and no doubt this model is being put into production.

PHILIPS LAMPS, LTD. One model—Tel. 6, with all-wave receiver and projected picture, price 165 guineas.

This Philips instrument is of especial interest in that it is one of the first production models in the world to which the projection principle of cathode-ray television is applied. The picture is formed on the end of a 4-in. cathode-ray tube and measures 2 × 1·6 in. This picture is bright enough to be enlarged 100 times when projected via a 45° angle mirror in the inside of the lid of the receiver on to a screen measuring 20 × 16 in.

The screen is incorporated in the cabinet and is of the back projection type. The etched screen is between two sheets of plain glass which protect its surface, and a slow-motion closing device prevents damage to the screen by sudden closing.

The broadcast receiver is a three waveband five-valve arrangement with Mono-knob control, and operates a speaker arranged high up in the cabinet to be as near as possible to the screen. There are twenty-eight valves in all in the instrument.



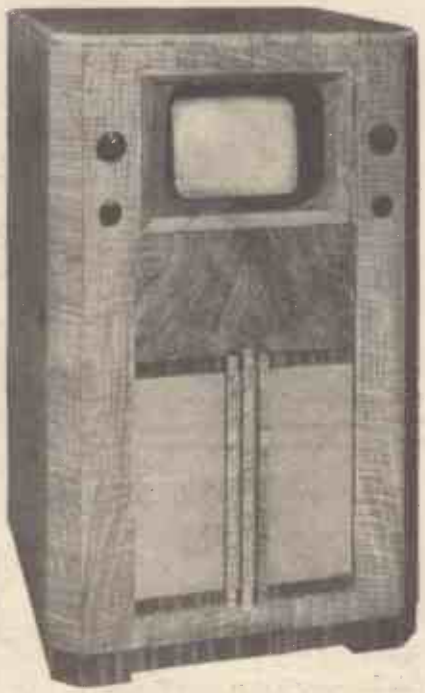
You could build this television set yourself! It is the complete instrument as made up from B.T.S. kits of parts.

There are four television controls. Two for occasional use effect tuning and spot focus, while the other two are for contrast and background brightness by varying the bias on the tube.

PYE RADIO, LTD. One model—4044, with all-wave radio receiver, price 75 guineas.

There are four television controls on this instrument, and the pictures are viewed in a mirror mounted in the cabinet lid. The incorporated radio receiver is a six-valver with four wavebands covering 13–33, 30–82, 198–556 and 900–2,000 metres. A five-position knob switches to any of these four bands or to television, as desired. A duode speaker is used which makes the most of the wide band of

(*Please turn to page* 644.)



The G.E.C. 60-guinea receiver, which employs direct viewing of the picture on the cathode-ray tube screen.

THE DIAL REVOLVES

By LESLIE W. ORTON

WHERE YOU CAN GET THE LATEST WAR NEWS

The Lively 20-Metre Band :: On the Ultra-Shorts :: Lunch-Time Americans

MARS, God of War, has been active again. Sparks have begun to fly in the Far East, and like two enraged cats Japan and China are at each other's throats. Planes zoom overhead, spreading death and destruction, whilst the roar of big guns adds to the terror and horror.

Yet it's an ill wind that blows no good, and much as we deplore war there is no denying that the DX-er has wonderful opportunities of picking up the latest war news ere the papers print it.

JZK and JZJ, Tokio, on 19·79 and 25·42 metres, are undoubtedly the best sources of news.

The Chinese version (or versions ?), may be had from XGOX, Nanking, on 43·82 metres, or from XGR (26 metres), and XGW (28·79 metres), at Shanghai.

Incidentally, English isn't the only language used, so how about polishing up your Chinese ?

" Aussies " Roar In

Have you boys noticed how lively the 20-metre band is ? It rivals Vesuvius for activity ! Recent catches of mine include : VE1BC, PY2ET, PY1FR, VO1I, HK4AH, CE2AC, CE3CD, LU7AC LU9BC, HI7T, and a Newfoundland amateur who remarked that he hadn't done any DX with the aerial he was then using. Unfortunately, I failed to catch his call, otherwise that " ham " would have had an eye-opener !

Among the North American stations I have heard have been W4DSY, W5JO, W8AM, W8EDT, W9VBQ, W9AH, W9IMI, W9IDC and my " star " catch W9YDC at Staplehurst, Nebraska —an attractive crowd.

And now you DX hounds, here's a hint : the " Aussies " are roaring in around 8 a.m. I've picked up VK2VV, VK2SV, VK2AC and VK2XU at astonishing strength, how about trying to duplicate—or beat—that reception ?

A Surprise From W2XAD

Many people will tell you that 13 is an unlucky number, and that if a Friday is connected with it it's likely to rain blood ! Fate seemed to be on strike last Friday, for I picked up W2XE, Wayne, on 13·94 metres at excellent strength—decidedly my lucky day.

By the way, listening to W2XAD the other night, I heard a talk by my Dad, and gee boys, wasn't I delighted ! The old rascal sounded in the seventh heaven, and being 3,200 miles away, had fifteen minutes' talk without interruptions—for I couldn't answer him back !

PCJ at Eindhoven has been the " star " on 19·71 metres, whilst W2XAF, W1XK, W2XE, W8XK and the usual batch of Europeans have provided plenty of thrills.

5-metre DX

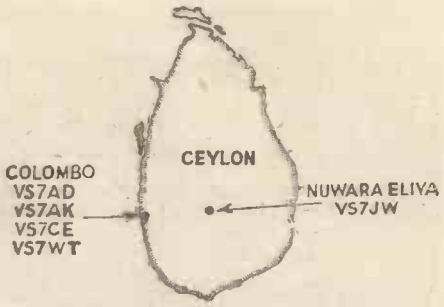
Snatching a letter from my pile, I find that it is from Mr. W. C. Barnes, of Swindon, who has been having field days of his own on the Wiltshire Downs, with the aid of a local radio club, a pocket 5-metre set, and a bag of sandwiches (to keep his pecker up !), but no mackintosh—the optimist ! During these manœuvres he heard the Alexandra Palace television sound programme as well as many experimental and amateur transmissions.

By the way, did I ever tell you of my ultra-short-wave reception amidst the ultra-high mountains of South Wales ? I picked up several amateurs, the Alexandra Palace station, and a host of gnat bites ! Gee boys, it's no easy task climbing with a radio set—you nearly lost your popular (*sic*) contributor on more than one occasion !

Trouble Brewing

We have all heard American stations at breakfast time, yes, and at tea time also, but now I'm going to report lunch-time Americans—a species sure to create trouble for many a noble DX hound ere conditions change ! One can waive aside breakfast, curtail tea, but woe betide the person who lets lunch grow cold—it's an unpardonable crime ! Yet that's just what these " Yanks " are tempting me to do—the blighters !

At 11.15 a.m. the other day I picked up W5YK, then W8AR Detroit. At 11.25 a.m., nearing home somewhat, VE1BY. Between 11.50 a.m. and 12.5 p.m. I tuned-in W2AD, W3FR, W3IS, W3MTD, W4MD, CO2AC and H17G—making the morning as full of excitement as a 2d. thriller !



Have you heard these Ceylon amateurs yet ?

CLUB NEWS

THE Liverpool Short-Wave Radio and Transmitting Club and the B.S.W.L. Liverpool Chapter will hold a General Meeting on September 6th to discuss the future of the club, and to arrange for various demonstrations and visits to local places of interest. Those already proposed are (1) A lecture by Messrs. Lissen, Limited. (2) A visit to a local telephone exchange. (3) If possible a visit to Spike Aerodrome to inspect the ultra-short-wave landing gear.

Morse classes are now being run for members' benefit. It is also proposed to hold a junk sale to help the club funds.

Will all persons interested in the club please write to the Hon. Secretary, C. E. Cunliffe, 368, Stanley Road, Bootle, Liverpool, 20, or, alternatively, call at the club rooms at 11, Wavertree Road not later than 8 o'clock on September 6th.

Short-Wave Station Identification

By F. A. Beane

STATIONS OF THE EAST INDIES

FROM Siam we wander down the Malay Peninsula to Kuala Lumpur where is situated ZGE. This broadcaster, operating on 48·92 m., is rarely, if ever, heard in Great Britain, since its power is low and wavelength unsuitable ; however, for the optimists I can give the following details : the schedule is Sundays, Tuesdays and Fridays, 13.00 to 14.45 B.S.T. ; the announcement is given as " This is Kuala Lumpur calling," and all programmes are concluded with " God Save the King."

Despite claims made recently of reception of the Singapore station ZHI, readers can take it from me that this station has definitely ceased operating on the short waves.

In Java there exists a most excellent short-wave service organised and controlled by the N.I.R.O.M., or if you prefer it, the Nederlandsch-Indische Radio Omroep Maatschappij. Stations PLP (27·26 m.), PMN (29·24 m.), PLV (31·86 m.), PMA (15·50 m.), and PLE (15·93 m.) are all Government owned, but at present only PLP and PMN carry regular broadcasts, the others being commercial telephony transmitters.

At the time of writing the following may be heard :

PMN (29·24 m.), Bandoeng, 11.30–16.30 approx., and 00.00–01.30. Announces almost exclusively in Dutch, the programmes consisting principally of gramophone records and native music. The usual announcement is (phon.) " Hier ist der NIROM (Neerom)." Six chimes repeated *ad lib* precede all broadcasts, and all programmes are concluded with an organ recording " The End of a Perfect Day " and the Dutch National Anthem.

PLP (27·26 m.), Bandoeng, broadcasts simultaneously with PMN. Both may be heard with a lively march at 00.00, followed by physical jerks and light gramophone recordings. The 00.00–01.30 session is not heard Sunday mornings. Time is 6½ hours ahead of B.S.T. and a studio clock may be heard at 00.30 B.S.T.

YDB (31.1 m.), Sourabaya. Frequently operates simultaneously with PMN-PLP, but is sometimes heard after the close of its compatriots.

YDC (19·80 m.), Bandoeng, may be heard with similar schedule to that of PMN-PLP. Signs off with the organ recording " The End of a Perfect Day." Occasionally relays native music simultaneously with PMN and YDB.

PMH (44·6 m.), Bandoeng, may be heard around 15.00 with native music. Usually an extremely weak transmission.

PLV, PLE and PMA may be heard irregularly with special programmes intended for Holland, and there are some twenty other NIROM stations operating on various wavelengths with low power, but it is very unlikely that any will ever be audible in Europe.

Continuing the description of his latest receiver, Britain's leading designer gives full constructional instructions and explains the simple operation of the "All-B.B.C." Set.

THE panel is a piece of plywood, on the front of which are the controls and on the back of which are the components. This Uni-plane construction very greatly facilitates construction and accurate duplication of the original set. A couple of side-pieces of plywood when screwed to the panel complete a receiver which stands by itself and looks smart. The cost of this system of construction, which makes a cabinet really unnecessary, is very small, and its popularity has been proved by the reception given to several of my sets using the idea, such as the S.T.700 and S.T.800.

A System Well Worth Retaining

Of necessity, the use of the Uni-plane system with the "semi-cabinet" tends to make my sets look alike, but such a criticism could be made of commercial sets, many of which show no originality of cabinet design or even sometimes no change as between a model of one year and that of a previous year, although the business part, the circuit, is utterly different.

Where a feature of construction saves much money and makes for simple and accurate building, it is well worth retaining and even making permanent. In the case of the present set there is every reason for adhering to my virtually standardised plan of construction.

MAKING THE 7-METRE COIL

THE 7-metre coil assembly may be made in the following manner, although it may be purchased ready made. The parts required are (1) about 4 feet of 16-gauge tinned copper wire, (2) one piece of ebonite, 3 in. × $\frac{3}{8}$ in. × $\frac{3}{16}$ in.; (3) six 6 B.A. × $\frac{5}{8}$ in. brass round-head screws, (4) twelve 6 B.A. nuts, (5) twelve $\frac{3}{8}$ in. washers with $\frac{1}{8}$ in. holes.

There are three separate coils mounted on the ebonite strip, namely the main tuning coil (i.e. the grid coil), the reaction coil and the aerial coupling coil. The aerial coupler has two turns and the grid and reaction coils have four turns each. The wire used for these coils should be first stretched by placing one end in a vice or other firm anchorage and pulling hard at the other end with, say, a pair of pliers.

The coils are wound on a $\frac{7}{8}$-in. diameter former. I actually used a broom handle $\frac{7}{8}$ in. in diameter. This gives a finished coil of 1 in. mean diameter, as shown in the diagram. The diameter of the former used *must* be $\frac{7}{8}$ in. It is preferable to err on the small side, as if you increase the diameter you will be unable to tune low enough on the finished set.

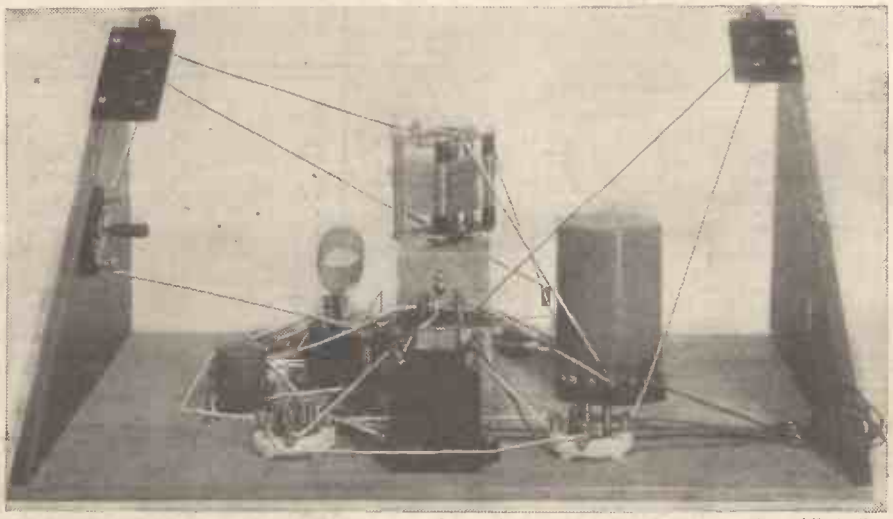
The wire should be wound tightly round the former with the turns touching. In the case of the grid and reaction coils about $4\frac{1}{8}$ turns should be wound, as on removing the coils from the former the coil expands in diameter and uncoils itself a trifle. About $2\frac{1}{8}$ turns are wound for the aerial coupling coil for the same reason.

Accuracy Is Essential

Bend down the ends of each coil at right-angles so that there are exactly 4 turns in the case of the grid coil, four turns for the reaction and two turns for the coupling coil, between the bends. Cut the ends of each coil so that 1 in. of wire projects at the bends, these 1-in. end-pieces being for mounting to the ebonite strip. Now stretch each coil so that the turns become spaced $\frac{5}{16}$ in., i.e. from the centre of one wire to the centre of the next.

Drill in the ebonite strip six $\frac{1}{8}$-in. holes to take the 6 B.A. screws, spaced as shown in the diagram. The mounting of the coils on the strip is clearly shown.

SEPARATE COILS FOR EFFICIENCY



To the left of the tuning condenser, in the centre of this photo, is the ultra-short-wave coil; while to the right of the condenser is the screened dual-range coil for medium and long waves.

YOUR GUIDE TO THE CONSTRUCTION

THE panel is specially metallised over the positions shown in the diagram. Note that there is no metallising behind the aerial coupler. If you like, you can use ordinary plywood covered where necessary with metal foil.

(*Continued overleaf.*)

THE "ALL-B.B.C." SET

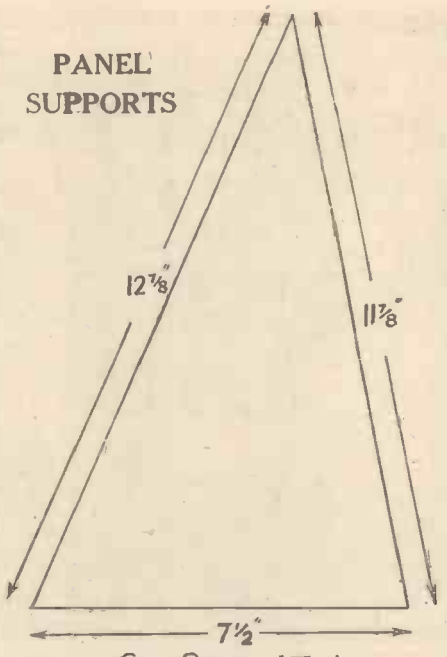
(Continued from previous page.)

Fit the B.T.S. flexible coupler to the back end of B.T.S. ·000025-mfd. tuning condenser. Remove insulating bushes which are attached to B.T.S. "U" condenser bracket, slip the fixing bush of the ·000025-mfd. tuning condenser through the smaller hole in the "U" bracket so that the body of the condenser is between the two parallel members of the "U" bracket and in the position shown in the wiring diagram. Lock the condenser temporarily in the bracket by means of its fixing nut. Fit insulating bushes to other hole in the "U" bracket. Slip the bush of the ·0005-mfd. J.B. tuning condenser through the insulating bushes. Slip the fixing nut of the ·0005-mfd. condenser over its spindle before the spindle enters the coupler on the end of the ·000025-mfd. condenser.

Setting the Condensers

Slip the spindle of the ·0005-mfd. condenser into coupler. Lock the ·0005-mfd. condenser to the bracket by means of its fixing nut in the position shown in the wiring diagram. Set the vanes of each condenser at maximum, i.e. fully meshed, and tighten the grub screws in coupler.

Prepare panel, side-pieces and terminal strips if these have not been purchased ready prepared. Remove the fixing nut locking the ·000025-mfd. tuning condenser to the "U" bracket. Temporarily fit the condenser assembly to the panel by means of the fixing nut just removed and fit also the aerial coupler and reaction condensers. This enables you to place the other components which are screwed to the back of the panel in their correct relative positions. Having placed these components in position, mark positions of fixing holes by pricking through these holes with a bradawl. Remove tuning condenser assembly, reaction and aerial-coupler condensers.



Two pieces of ⅜-in. wood cut to the dimensions above are screwed to the panel and support it in a sloping position for comfortable operation.

Place panel face downwards on the bench or table, and screw the components on the back. Now remount tuning condenser assembly, aerial coupler and reaction condensers, two wavechange switches and on-off switch.

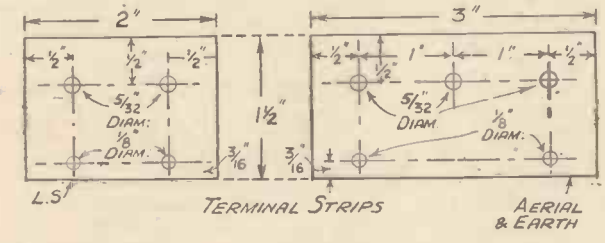
The set is now ready for wiring. No. 18 gauge tinned copper wire is used for this, and it is covered with insulating sleeving. Battery leads are 14/36 rubber-covered flex.

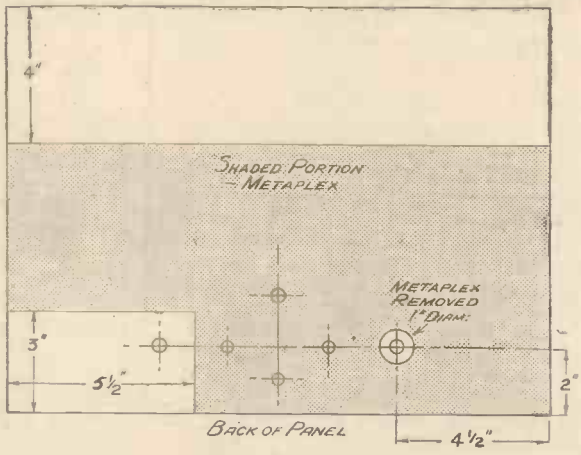
Wiring the Coil

Fit wires of following lengths to the terminals of the 7-metre coil assembly: Terminal "R1," 4½ in.; terminal "G," 3 in.; terminal "R2," 3 in.; terminal "E" 3 in.; terminal "A," 6½ in.; terminal "S," 5½ in. To this last terminal fit also a rubber-covered flex lead 7½ in. long, and to the other end of this lead fit the wander-plug supplied with the Colvern D.U. coil. Fit lead from moving vanes of ·000025-mfd. tuning condenser to 4-point ultra-short-wave wavechange switch. Fit lead from "F—" terminal of V1 to 4-point wavechange switch. Now wire the 7-metre coil assembly in circuit. Its wiring holds it in position.

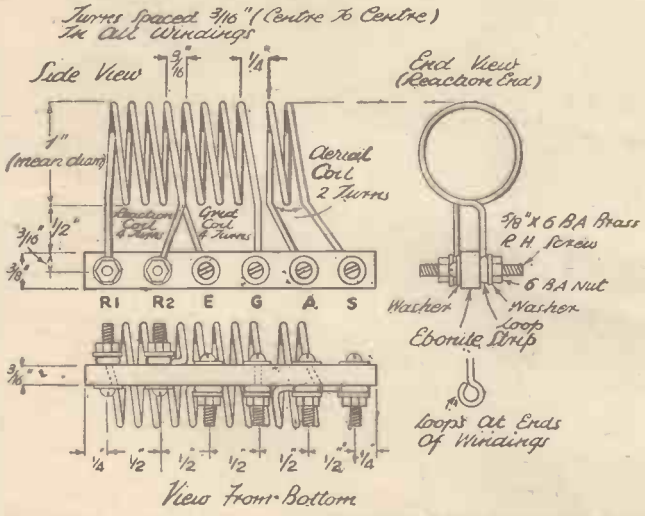
Fit wander-plug on flex lead from terminal "S" of 7-metre coil assembly to No. 1 socket in Colvern D.U. coil. The remainder of the wiring may be done in any order, the leads being marked off on the diagram as they are put on the set. Having completed the wiring except for the

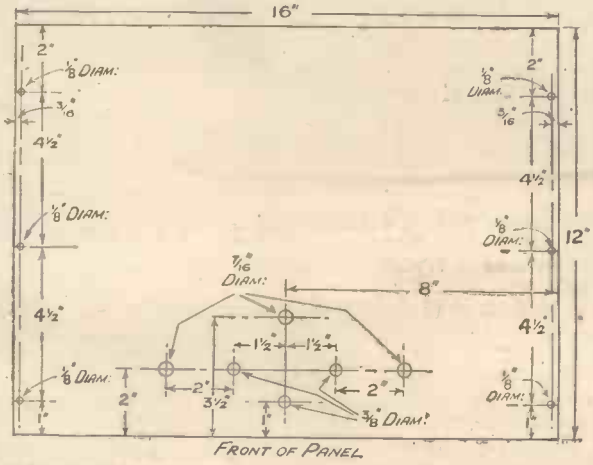
(Please turn to page 634.)





Much of the constructional work of the "All-B.B.C." set is covered by these diagrams. Above are shown the drilling dimensions for the two terminal strips, while below are full details for making the ultra-short-wave coil. To the right will be found all the panel dimensions including those of the area of the back of the panel that is covered with metallising.





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KIT "A" All parts, including ready-drilled panel and chassis, four 6-pin and four 4-pin coils, drawings and instructions, less valves, 'phones and cabinet. *List Value* £4/5/4. Our Price **£2 : 19 : 6** Cash or C.O.D., or 5/6 down and 11 monthly payments of 5/6.

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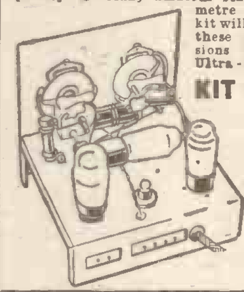
ULTRA SHORT-WAVE 3 Kit

● Waverange 4.75 to 7.7 metres ● Receives Alexandra Palace television sound programmes with amazing quality ● Many amateur stations operate on the 5-metre band—this wonderful kit will enable you to pick up these interesting transmissions ● Very latest 3-valve Ultra-Short-Wave Circuit.



KIT "A" All parts, including ready-drilled chassis and panel, drawings and instructions, less valves. *List Value* £2/10/5. Our Price **£1:17:6** or 2/6 down and 11 monthly payments of 3/6.

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● Waverange 10-52 metres. ● Wonderful new World-wide circuit ● Peto-Scott Duplex Epicyclic tuning simplifies long-distance reception ● 9:1 and 80:1 slow motion dial ● Air-space condensers ● For A.C. Mains, 200-250 volts, 40/80 cycles.

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KIT "A" *Cash or C.O.D. Carriage Paid* **£3/2/6**

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Or 5/9 down and 11 monthly payments of 5/9.

KIT "B." As for Kit "A," but with set of specified valves. Cash or C.O.D. Carr. Pd. £3/19/6, or 12 monthly payments of 7/3.

Recommended Peto-Scott P.M. Moving-Coil Speaker, Model 101 ... ... 19/6
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—POPULAR AS EVER!—

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KIT "A" YOURS FOR **7/- DOWN**

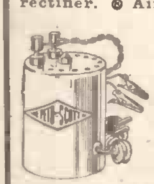
Complete Kit of Components exactly as FIRST specified and used by Mr. J. Scott-Taggart, with Konectakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker. Cash or C.O.D. Carr. Pd. £3/10/0, or 7/- down and 11 monthly payments of 6/4.

KIT "B" As Kit "A," but with 4 first specified valves, less cabinet and speaker, etc., £4/16/6, or 9/- down and 11 monthly payments of 8/10.

Charge your L.T. for ½d. per week!

PETO-SCOTT TRICKLE-CHARGER

● 12 months' guarantee. ● Nothing to wear out or go wrong. ● Modern metal rectifier. ● Air-cooled mains transformer. ● 7 days' approval against cash.



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Gramophone Motors
Gramophone Pick-ups
Microphone
Portable Receiver
Radiogram-Converter Unit
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Speakers, P.M. and Field-Energised
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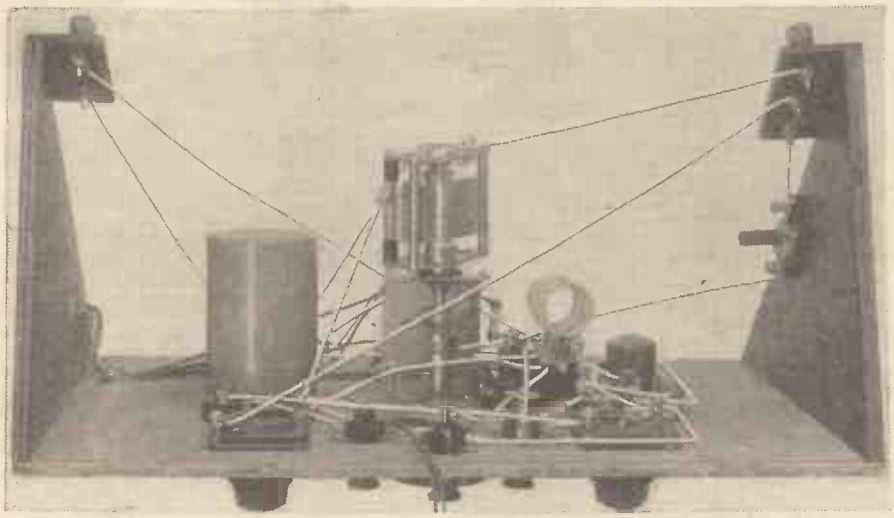
All P.O.'s must be crossed and currency registered.

TWO CONDENSERS ON ONE SPINDLE



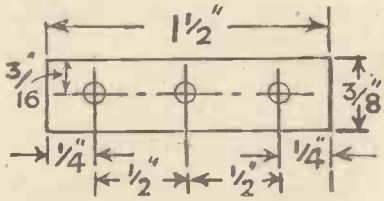
The broadcast tuning condenser, and the small-capacity ultra short-wave condenser are controlled by the same spindle. These condensers can be seen in the centre of this photo, the U.S.W. condenser being next to the panel.

(*Continued from page* 632.)

leads to A1, E, L.S.+, L.S.— terminals and the lead to the ·00005-mfd. pre-set condenser on side-piece, the side-pieces should be prepared ready to fit to the panel.

Mount terminals on terminal strips. Mount terminal strips on side-pieces. Mount ·00005-mfd. pre-set condenser on inside of side-piece carrying A1, A2 and E terminals. Connect one terminal of pre-set to terminal A2.

Fit side-pieces to the panel. Complete wiring. Fit wander-plugs and accumulator "spades" (if used) to battery leads. Fit knobs to reaction and aerial-coupler condensers, and to wavechange and on-off switches.



BATTERY LEAD CLAMPING STRIP

The use of this strip prevents any strain on the battery leads from reaching the points where they are joined to components.

Fit knob pointer to tuning condenser. The set is now complete. The design of the dial card to go behind the pointer is left to the constructor. A plain card marked where the principal stations come will do.

OPERATING THE "ALL-B.B.C." SET

THE operation of the set is simplicity itself. There is only one tuning knob in the centre of the panel. The aerial coupler knob is on the extreme right, and it serves both as a volume control on all three wavebands and as a means of increasing selectivity. By turning the aerial coupler knob to the left (anti-clockwise) signal strength is reduced and selectivity improved, reaction being, of course, increased when the best "selectivity" is desired. When the knob is turned to the right (in the direction in which the hands of a clock move) signal strength is increased and selectivity impaired—although this latter effect does not at present matter on the 7-metre band.

When using the experimental A2 terminal (to which the aerial may be connected) the ·00005-mfd. pre-set should be set to a very low value, that is, screwed well out. The aerial coupler has no effect, of course, when A2 is used, but the main tuning and reaction controls are used in the ordinary way.

The Batteries

The batteries required are a 2-volt accumulator, a 120-volt high-tension battery and a 16½-volt grid-bias battery. The set has been designed so that it will operate equally well off a mains unit, but the correct tappings (given below) should be taken.

The battery connections are as follows:

G.B. + to + in grid-bias battery.

G.B.—1 to —3 v. in grid-bias battery.

G.B. — 2 to — 12 v. in grid-bias battery.

H.T.— to — in H.T. battery.

H.T. + 1 to + 60 to 90 volts in H.T. battery.

H.T. + 2 to + 120 volts in H.T. battery.

In the case of an eliminator giving 150 volts, bias to G.B.— 2 should be increased to —15 volts, and H.T.+1 should be connected to one of the intermediate tappings and *not* to the S.G. tapping on the mains unit.

J. S.-T.

[Will constructors please note that in the "All-B.B.C." wiring chart on page 598 of last week's "P.W." the ultra-short-wave tuning condenser is erroneously shown as ·00025 mfd. This should be ·000025 mfd., as specified in the list of components and in the article.—Editor.]

THE POWER SUPPLY

Batteries: H.T. 120 v. — Drydex, G.E.C., Aerialite, Milnes H.T. Unit, Lissen, Fuller.
G.B. 16·5 v. — Drydex, Lissen.
L.T. 2 v. — Exide, Lissen, Fuller.
Mains Units: Ekco, Atlas.

SUITABLE LOUDSPEAKERS

W.B., Rola, Wharfedale, Blue Spot, Amplion. (No significance attaches to the order of makes.) J. S.-T.

ON STAND No. 13

The original models of the "All-B.B.C." Set and the famous S.T.800 are to be seen on the POPULAR WIRELESS Stand at Radiolympia.

The Radio Exhibition closes on Saturday, September 4th, and we recommend all who are able to avail themselves of the opportunity offered by the remaining days of the Show to visit our Stand and examine these magnificent examples of simplified home construction.

FOLLOW THIS LIST CAREFULLY

Component	Make Used by Designer
1 ·0005-mfd. tuning condenser	J.B. as in S.T.800
1 Knob and pointer	J.B. as in S.T.700
1 ·000025-mfd. tuning condenser (with flanged fixing nut)	B.T.S. type S.T.C.425
1 "U" bracket with insulating bushes for mounting above condensers	B.T.S.
1 Flexible coupler for ganging above condensers	B.T.S.
1 Screened broadcast coil	Colvern type D.U.
1 ·0005-mfd. solid dielectric aerial coupler condenser	Graham Farish log-mid-line (as in S.T.800)
1 ·0003-mfd. solid dielectric reaction condenser	Graham Farish log-mid-line (as in S.T.800)
1 ·006-mfd. mica fixed condenser	Lissen
1 ·0001-mfd. fixed condenser	T.C.C. type 34.
1 ·00005-mfd. mica pre-set condenser	J.B.
1 H.F. choke	Wearite type H.F.J.
1 L.F. transformer	Varley "Niclet" 3·5/1
1 2-meg. resistor	Dubilier half-watt
1 1-meg resistor	Dubilier half-watt
1 30,000-ohm resistor	Dubilier half-watt
1 20,000-ohm resistor	Dubilier half-watt
2 5,000-ohm resistors	Dubilier half-watt
3 4-pin S.W. baseboard valve holders	B.T.S. type 4CH.
1 2-pt. push-pull on-off switch	Wearite type G.S.P.
1 3-pt. push-pull W/C switch	Wearite type G.W.C.
1 4-pt. push-pull W/C switch	Wearite type G.F.P.
1 block condenser 2 × 2 × 1 mfd.	T.M.C. type B.1007
5 Terminals marked A.1, A.2, E., L.S. —, L.S.+	Belling & Lee type R
6 Wander plugs marked Grid +, Grid — 1, Grid — 2, H.T. —, H.T. + 1, H.T. + 2	Belling & Lee midget
2 Accumulator connectors marked L.T. —, L.T. +	Belling & Lee
1 Polished wood panel, 16 in. × 12 in. × ¼ in. (reverse partly Metaplex—see diagram)	Peto-Scott
2 Side pieces (see diagram)	Peto-Scott
1 Ebonite terminal strip, 3 in. × 1½ in. × ⅛ in.	Peto-Scott
1 Ebonite terminal strip, 2 in. × 1½ in. × ⅛ in.	Peto-Scott
1 Fibre battery lead clamping strip	Peto-Scott
12 feet 18-gauge T.C. wire	Peto-Scott
5 lengths of 1½-mm. insulating sleeving	Peto-Scott
4 feet 16-gauge T.C. wire for U.S. coil	Peto-Scott
Ebonite base for same, 3 in. × ⅜ in. × ⅛ in.	Peto-Scott
Screws, washers, flex, etc.	Peto-Scott

VALVES

V1.	V2.	V3.
Mazda L2. (met.)	Marconi or Osram L 21.	Hivac PX 230.

ON THE SHORT WAVES

POINTS from the POST-BAG

W.L.S. Replies to Correspondents

WILL all the "converter fans" please lay off for a week or so? I have been absolutely deluged with letters asking for a detailed design of an up-to-the-minute short-wave converter and for particulars of connecting it to all kinds of sets from a 60-guinea radio-gramophone to Baby portables!

I hope shortly to give the layout and circuit of a suitable converter, but this business of adapting it so that it may safely be connected to any old set takes a lot of time and thought.

Brazilian Stations

S. J. (Croydon) has sent me a chart which he has received from the Companhia Radio Internacional do Brasil, giving particulars of the various Brazilian stations on short waves. Those used for short-wave broadcasting (irregularly) are P S E on 20·87 metres, P S H on 29·35 metres, and P S K on 36·65 metres. The regular broadcast transmitter, of course, is P R F 5 on 31·58 metres.

Other Brazilian telephone stations, not used for broadcasting, are P S A (14·23 metres), P S F (20·42 metres), and P S J (31·1 metres).

H. C. (Canterbury) sends in an S O S. He would like to get into touch with some other short-wave fan in that part of the world, and asks me to publish his address: H. Cocksedge, 16, St. Jacob's Place, Wincheap, Canterbury. He uses a "Simplex" Two and finds it good, but he can't get it to function on the "ultra shorts."

H. A. K. (Birmingham) wants me to publish full details of the "Simplex" Two as a mains set. He uses one with an eliminator, which is perfect, but he can't get the Three to behave itself even with the same mains unit. I'll see what can be done with an all-mains Simplex, but it will probably turn out to be a brand-new one and not one of the old series. (Incidentally, we've never had a "Simplex" One! Food for thought there.)

On the 80-Metre Band

H. J. B. (Manchester) reports that the fine weather has claimed him, but he has managed to do a bit of listening in between whiles. One morning he got up at 5.30 and listened on the 80-metre band. Results were as good as if it had been winter—he heard lots of Yanks on 'phone, all R 7 or R 8. H. J. B. also finds 20 metres quite interesting in the mornings, what with Australian phones and occasional bursts from the U.S.A. 5th District and the like.

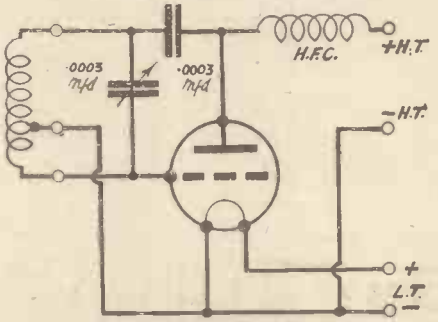
He has heard L U 7 A Z (Argentina) on 10 metres quite recently, but all his efforts on 5 metres seem to have been wasted as yet. I don't suppose there's anything within range of him.

Mr. Eric Walsh, of 55, Upland Road, London, S.E.22, tells me that there is now a radio club in Dulwich. If any readers are interested, they may obtain full particulars from the Hon. Organiser, Mr. C. E. Newton, at 105, Underhill Road, S.E.22. The club has a large room for practical work and on certain nights experienced members are there to give beginners a helping hand. Forward, enthusiasts of Dulwich!

G. W. (Birmingham) is building a set with H.F. and detector, both rigged up with band-set and band-spread condensers. In accordance with the best modern practice, he is keeping the band-setters separate and ganging the band-spreaders. He now suspects (quite rightly, too!) that if he uses the "ten-notch" type of band-setters he will also want a small trimmer across one of them. The H.F. one would be the better one to fit with this trimmer, I think. He sends along his full circuit diagram, which passes with honours.

A. F. (Ulster) seems to be in trouble with a two-valver, in which he is using a single-coil circuit somewhat similar to the one shown in the sketch on this page. He finds it impossible to tune-in telephony because of a "terrible whistle." When he plays around with reaction this turns to a howl, which makes me think that his set never stops oscillating, but just goes over that sort of "second oscillation point" which one can often find with certain kinds of reaction control. I suggest (*a*) a much smaller reaction condenser, or (*b*) a change of H.F. choke.

A HARTLEY SCHEME



This circuit, which is a form of the well-known Hartley arrangement, is suitable for use as an oscillator circuit for a wavemeter or for testing purposes.

R. S. (Dagenham) has lost the discs over the tops of some of his short-wave coils, and asks me for their ranges. I suspect that the seven-turn one is roughly 22–47 metres, and the twelve-turn one is about 40–80 metres. But from what he tells me of the pin connections they are the old type of coils.

R. J. H. (Trowbridge) brings up a question about soldering leads to the pins of coil formers. In case other readers are in a fix over this, I may as well explain that by far the easiest way (in fact, the only way that has occurred to me) is to push the wire from the end of the winding right through, clean about an inch of it and solder it from the bottom, i.e. the outside. From what R. J. H. says, I gather that he has been trying to get his soldering iron down inside the former.

The sketch on this page shows a form of the well-known Hartley circuit, and is reproduced by special request. Single coils are required, and they need to be tapped at a point about a quarter or a third of the way up from the grid end. This is *not* intended as a receiver, but as an oscillator circuit for a wavemeter or for testing purposes.

Short-Wave News

NOT a great deal of real news about the place, except that this week-end sees the high-spot of British amateur radio—the Radio Society of Great Britain's Annual Convention. Many visits to places of interest have been arranged, and on Friday and Saturday the official part of the Convention ends with a Conversazione (Friday evening), several meetings (Saturday morning and afternoon) and the dinner (Saturday evening).

The whole affair gives the provincial hams an excellent opportunity of meeting the Londoners (and, of course, one another) and many points that come up for discussion lead to important developments in the future policy of amateur radio.

The Opening of a New Season

But don't imagine that Convention finishes when the last guest departs from the dinner on Saturday night. Sunday will be spent on informal station visits, and quiet suburban roads that normally do not see much of life will find queues of twenty cars or more waiting outside the house owned by "that feller with the big wireless pole." Don't I know it! My own shack is designed to seat three or four in comfort, but once, after a Convention, I counted twenty-two heads through the haze of tobacco smoke.

I always look upon Convention as the real opening—with a bang—of a new season, and get down to things seriously myself. You will find amateur activity really away in full winter style by the time the Big Binge is over.

I suppose readers have all noticed the amazingly strong amateur signals that come over from South America some nights on 20 metres? They're not always there, but when conditions happen to favour South America some of those fellows in Brazil and Argentina fairly make the welkin ring. Generally speaking, the conditions for Yanks are not good at the same time, although one occasionally finds a night of nights when both North and South America are extra good.

10-Metre Yanks?

Listening on 10 metres the other night, I heard several signals that were too weak to identify. Am I right in assuming that they were the Yanks beginning to break through at last? There were crowds of them, but an R2 signal would have been strong in comparison with any of them. It really is quite a thrill to hear a band like this, and to know that all that feverish activity is going on somewhere but is quite beyond your reach. I have even heard it on 20 metres when conditions have been really bad.

How many readers managed to bag some of the R.A.F. stations and aeroplanes during the August manœuvres? I can't spill the beans about the wavelengths used, except that to hear everything one needed a receiver that would go up to about 80 metres. And that's only just a broad hint.

W. L. S.

MARCONI—THE MAN AND HIS WIRELESS

CHAPTER XVII—DEFENDING HISTORIC PATENTS

Marconi Defends His Patent Rights in New York—Historic Patents Involved—A Judge's Review of Wireless Development—Why Marconi Won the Suit—Some Incompatible Facts About Wireless—Marconi Awarded More Honours and Title of Senatore

FEVER of war was in the 1914 air. Marconi in the United States battling in the courts for his patent rights learned that the glory road of invention is seldom, if ever, strewn with roses. The climb from the conception of an idea to establishment of priority is a long, tedious journey that tests the mettle of the man, and at times he must wonder if it is all worth the candle. There are many who aim to dim his glory and capture his laurels for themselves. Marconi found the truth in that cynical proverb: "A patent is merely a title to a lawsuit."

The most harrowing part of invention is usually what follows filing of the patent claim. Invention is but the spark that kindles a great fire upon which theorists and imitators seek to offer the inventor to the gods of destruction. The days in the wake of invention are a crucible for the very heart of the man who conceived the idea and carried it to a practical conclusion.

It was not until 1914 that Marconi was declared absolute victor on the patent battlefield. Judge Van Vechten Veeder, in a decision in the United States District Court (Eastern District of New York in Brooklyn), paid high tribute to Guglielmo Marconi as the inventor of wireless. He held that all of the patents filed in the United States by Marconi and his associates were valid.

The decision was regarded by the Marconi Company as of the widest importance to the Marconi interests. It put the control of wireless telegraphy in America practically in the company's hands. It declared the National Electric Signalling Company of Pittsburgh, the Marconi Company's only formidable rival in the United States, to be an infringer in vital particulars.

Marconi had attended the hearings before Judge Veeder in June, 1913, and upon the witness-stand he told the full story of his invention, describing its development from a "toy" that could send sounds across a table at his father's home to an international means of communication capable of sending messages from Ireland to the Argentine.

The suit was brought for damages and an injunction against the National Electric Signalling Company, but it was fought from the first as a test suit to establish the judicial status of the Marconi patents in the United States.

Many authorities were called by the defence to prove that others than Marconi had invented wireless devices, and that inventors, since his system was first put on the market, had the same right to use it as a basis for improvements, in the same way he had to improve upon such devices as he found in existence before his day.

F. W. H. Clay, attorney for the defendants, cross-examined Marconi. The legal questions did not disturb the witness, but when the cross-examiner got into the science of wireless the inventor seemed amused, and once told the attorney smilingly that the question was absurd.

Marconi was asked if he regarded Professor A. E. Kennelly of Harvard University as an authority on certain phases of wireless.

"He is known as an eminent electrical engineer in America," replied Marconi, avoiding any criticism of him, "and I have no reason to say that he is not an authority on those matters. I do not know that he has studied this subject as deeply as I have along certain lines."

Mr. Clay referred to an article in which Professor Kennelly made statements relating to mathematical problems in wireless science, and he pressed the witness further for his opinion of the author.

"I am afraid that my confidence in Kennelly is shaken by what you have just shown me," replied Marconi. "Whether he is a mathematician or not, like everybody else, he is likely to be wrong."

As Marconi left the court-room at the end of that day a reporter asked if he was working on any new inventions.

"I am always working," he replied, with a smile.

As the trial progressed, witnesses for the defence admitted that the defendant company's apparatus was derived in part from Marconi instruments.

The defence was then centred upon a charge that a decision for the Marconi Company would in effect be the licensing of a monopoly in wireless that would involve even the United States Government's wireless station at Arlington, Virginia, and all other Government installations.

The patents at issue were No. 11,913, issued to William Marconi on July 13th, 1897; No. 609,154, issued on August 16th, 1898, to Sir Oliver Lodge, and later acquired by Marconi; and No. 763,772, granted on June 28th, 1904, to William Marconi. This was the famous "four circuit" tuning patent which covered the basic principles upon which all wireless telegraph systems depended.

Furthermore, this patent was regarded as the most vital of the group, because counterparts of that patent had already been held valid by the courts of Great Britain and France. The decision of Judge Veeder was held by lawyers of the Marconi Company to give the organisation control of the international wireless situation.

While the Veeder decision established the validity of the three patents, it held that the National Electric Signalling Company infringed only the latter two, and not the original Marconi patent which was issued before improvements made long-distance signalling possible.

Judge Veeder's sweeping decision, which went exhaustively into the history of wireless from the days of Egyptian signal fires down to the Marconi inventions, swept away the defendant company's assertions that others preceded Marconi as inventor of a practical wireless system. This is his summary of what actually had been done:

Maxwell, in 1863, had speculated on the possibility of the production of electric waves which would detach themselves from a source of origin. Hertz, in 1887–88, had proved experimentally that Maxwell's theories were correct. Lodge, in 1889, had repeated Hertz's experiments. Branly, in 1890, had repeated Hertz's experiments

(Continued overleaf.)

BROADCASTING TO AMERICA

The great inventor inaugurating a special series of short-wave broadcasts from Rome to the United States in 1934.

MARCONI—THE MAN AND HIS WIRELESS—*continued*

and had also discovered that certain substances, in addition to Hertz's ring resonator, were detectors of electric waves. Crookes, in 1892, had forecast the possibilities of wireless telegraphy by the utilisation of Hertzian waves.

Lodge, in 1894, had reviewed the experiments of Hertz and Branly, and some of his own, touching the form which electric waves took when emanating from their source of origin, and upon substances which would detect those waves. Popoff, in 1895, in similar experiments, had noted that he could detect the existence of a distant thunderstorm, and expressed the hope that wireless telegraphy could be accomplished by the utilisation of Hertzian waves.

But no one had described and demonstrated a system of wireless telegraph apparatus adapted for the transmission and reception of definite, intelligible signals by such means. This was the state of scientific knowledge and practice when, in 1896, Marconi applied for his first patent.

"Accordingly, I find," said Judge Veeder, "that the evidence establishes Marconi's claim that he was the first to discover and use any practical means for effective telegraphic transmission and intelligible reception of signals produced by artificially formed Hertz oscillations."

More than fifty pages of Judge Veeder's decree were devoted to a discussion of the third Marconi patent, which had been held valid in Europe. Relative to the manner in which Marconi achieved his final wireless triumph with instruments designed under this patent, Judge Veeder said:

With this apparatus Marconi communicated across the Atlantic in 1901 and the claims in issue constitute the essential features of apparatus which has since made possible communication over a distance of 6,000 miles. It has been used in more than 1,000 installations by Marconi, and is admittedly an essential feature of the wireless art as at present known and practised.

Particular stress was laid upon Marconi's discovery of the vertical aerial wire and the connection of the apparatus to earth or water, and the advantage gained in adopting such methods. The opinion which gave Marconi full credit for the disclosure of the adaptability of such means, stated:

I think the described characteristics of the grounded vertical conductor plainly indicate its utility for a long-distance transmission, as does also the statement that "the larger the plates of the receiver and transmitter and the higher from the earth the plates are carried the greater is the distance at which it is possible to communicate."

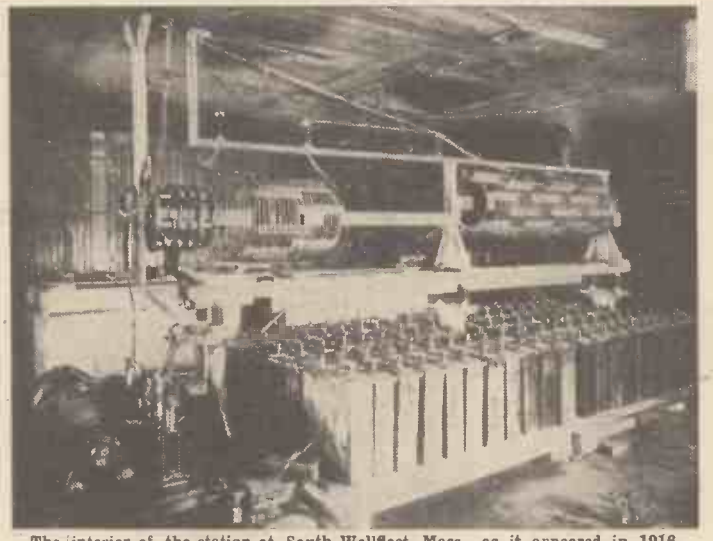
The fact that Lodge made no reference to ground connections in his subsequent lecture on the work of Hertz was considered as evidence to show that an earlier statement by him was nothing more than an incidental reference to an abandoned experiment. The Lodge patent dated August 18th, 1898, was discussed in detail, and he was given the credit for the first realisation of the advantage to be derived in the matter of sharpness of tuning by the use of feebly damped or more persistent oscillations.

It should not be forgotten, however, that in Marconi's original patent he specified that his elevated capacity areas or plates are "preferably electrically tuned with each other," that is, of similar electrical dimensions.

It cannot be denied, therefore, that Marconi thoroughly understood at the date of issue of his first patent the necessity of tuning the open circuit of his transmitter to the open circuit of the receiver.

Comparing the early work of Hertz in his experimental investigations in respect to tuning with that of Marconi at the time of his discovery of the completed wireless system the opinion of the court stated:

SOUTH WELLFLEET IN 1916



The interior of the station at South Wellfleet, Mass., as it appeared in 1916. It was from this station thirteen years before that Marconi transmitted a message from President Theodore Roosevelt to King Edward VII, the message being picked up at Poldhu, in Cornwall. South Wellfleet was dismantled in 1918.

While Hertz effected whatever tuning was possible in his structure by adjusting the capacity and inductance in the closed receiving circuit, Marconi adjusted the capacity of his open transmitting and receiving circuits.

While Lodge undoubtedly understood the sharp resonance effects to be had in the use of feebly damped oscillations his apparatus left much to be desired in obtaining long-distance communication. Although Lodge in his 1898 patent came forward with a new idea he recognised the impossibility of having a circuit which should be at once a good radiator or absorber and a persistent oscillator. He therefore proposed a compromise.

To quote the court:

He increased the persistence of vibration of his radiating circuit at the expense of its radiating qualities, and increased the accumulative power of his receiving circuit at the expense of its absorbing qualities.

Effecting this compromise by means of the introduction of an inductance coil in an open circuit, he obtained a train of waves of approximately equal amplitude and thus rendered effective syntony possible. But the syntony thus obtained was utilized for selectivity alone. It was attained at the expense of the radiating and absorbing qualities of the circuit; and Lodge still supposed that for distant signalling the single pulse or whip crack was best.

Where Lodge compromised, Marconi reconciled.

Marconi overcame the difficulties emphasised by Lodge. In his second patent covering improvements upon his own prior apparatus, Marconi solved the puzzle. The improvement consisted in the substitution of a pair of circuits in both transmitter and receiver in place of a single circuit. One was so designed as to radiate or absorb readily, and the other to oscillate persistently and be a good conserver of energy. Finally, the four circuits must be tuned together.

The court distinctly stated that with Marconi's apparatus he was not only able to obtain the persistency of oscillation of the apparatus of Lodge, but also obtained such effects without any sacrifice of radiating qualities, and furthermore allowed an increase in the available amount of energy drawn from the local circuits of the transmitter. With this definite control over radiation effective selectivity was maintained and the distance over which messages could be sent was enormously increased.

The defendants claimed that various inventors had disclosed previously to Marconi his method of "four circuit" tuning. The opinion of the court in each instance disproved and cast aside the allegation. No proof or mention whatsoever was found in the publications or lectures of Fessenden that he recognised the necessity of "four circuit" tuning in a complete wireless system.

Likewise patents of Tesla were brought to the front as being prior disclosures of the Marconi inventions in respect to "four circuit" tuning. The court clearly stated the impossibility of obtaining wireless telegraph communication with apparatus such as Tesla described, for by calculation it was shown that the local oscillatory circuits of the Tesla transmitter were vibrating at a wavelength of 1,200 metres, while the elevated wire, which he suggested should be somewhere in the vicinity of from six to seven miles in height, would have a wavelength from 28,000 to 56,000 metres. The coupling of these two circuits would in no sense bring about a condition of resonance, and, therefore, Tesla's conception was declared entirely remote from the subject matter of Marconi's patent.

The defendant argued that Pupin had been instrumental in the discovery of "four circuit" tuning. Ample evidence was introduced to disprove such contentions, closing the matter once and for all. Summing up certain statements by Pupin in 1899 the opinion stated:

It is absolutely incompatible with the supposition that Pupin himself or anyone so far as he knew had solved this problem.

(*Please turn to page* 640.)

MARCONI—THE MAN AND HIS WIRELESS

(*Continued from page* 638.)

Thus the famous four-circuit tuning patent established Marconi as the master of wireless. The manner in which his work withstood the onslaught in the courts was like a spotlight on his genius and the mind that had a clear conception of wireless from the beginning.

There was not the slightest doubt that to Marconi belonged the diadem of wireless, after Judge Veeder handed down his historic decision on March 17th, 1914.

The American Press quite generally agreed along this line of thought: "In spite, however, of the fact that litigation over wireless telegraphy will doubtless continue in one form or another for years to come, Justice Veeder's decision, confirming as it does others to like effect in England and France, gives Mr. Marconi a strong position from which to conduct his battle.

"It is in harmony too with public sentiment everywhere, for there never has been any question in the general mind as to the originator of wireless, or to whom fame and gratitude should be accorded for the most inestimable benefits which the world has derived and will derive from this remarkable invention."

Almost daily the invention seemed to fulfil predictions. The big station at Nauen, Germany, known by its call letters, P O Z, had established communication on March 14th, 1914, with Windhoek, Cape of Good Hope, South Africa, 6,000 miles away. In preliminary tests on February 11th, the first message between Berlin and New York went to *The New York Times*, and carried a greeting to Mayor Mitchel.

Not to be outclassed, Italian warships off the Sicilian coast on March 15th received clear radiophone messages from Clifden, Ireland, 1,750 miles distant, and from Rome 300 miles. The ships, while forty-five miles apart, conversed by the wireless phone for twelve hours without a break.

"The problem of the wireless telephone has been practically solved," said Marconi, who had taken an active part in the tests. "This has been proved by successful experiments on board the Duke of Abruzzi's flagship, the Regina Elena, off Augusta, Sicily . . . If sufficient energy is used radio telephonic communication will be quite possible at the longest distances. My conviction is that the day is not far off when the human voice will cross the Atlantic."

Already possessor of the coveted Nobel Prize, the Medal of the British Council of the Royal Society of Arts was added to Marconi's trophies on June 9, 1914; and he had the Russian Order of St. Anne; the Italian Order of St. Maurice and St. Lazarus; also the Italian Grand Cross of the Crown.

Italy made him a Senatore, i.e., Member of the Upper Legislative Chamber, an honour signifying recognition of a high order of accomplishment in the Arts literature and science. The requisite age is forty, and it is a life appointment. Royal princes are the only members of the Senate who enter automatically. The Senate is dubbed "the Sleepy House" because of the small attendance in ordinary times and the somnolence frequently displayed in consideration of routine matters.

Whenever a Senatore votes "Yes" on a Senatorial appointment it is equivalent to saying to the candidate, "You are one of Italy's living great men and we welcome you as such."

They are mature men of sober judgment who have breasted the world and won their way to the top. The nation awards them for having shed glory upon it.

Marconi was one of them.

HAVE YOU BEEN TO THE RADIO SHOW?

Time is getting short now, and if you haven't visited Radiolympia you should certainly do so, if possible. The hours are from 11 a.m. to 10 p.m. and the price of admission is 1s. 6d. The Show closes on Saturday, September 4.

NEXT WEEK:

CHAPTER XVIII

MARCONI GOES TO WAR

— ALSO —

WHAT I SAW AT RADIOLYMPIA

By Our Special Representative

QUESTIONS AND ANSWERS

By K. D. ROGERS

USING A D.C. ELIMINATOR

WHY THE CHASSIS IS LIVE

T. G. (Birmingham) *writes to say that he has recently bought a D.C. mains unit, but when he connects it to his battery set the fuse lamp glows and he gets no results. He further states that the chassis of the set seems to be alive.*

His trouble is undoubtedly one that concerns the earth connection. He has had the set and mains unit tested and they are both O.K.

He must not forget that he is probably on a mains circuit where the positive side is earthed. In that case, his H.T. plus is at earth potential, and if he also joins the L.T. and H.T. — in his set to earth he must expect trouble.

He must read the instructions for connecting carefully and see that he has placed the earth connection from outside the house to the earth terminal on the eliminator and not to the earth terminal on the set. This latter is probably not used at all, or if it is, it is connected to some terminal on the eliminator and not direct to earth.

Another way out of the difficulty is to connect a 2-mfd. fixed condenser capable of standing 350 volts in series between the earth terminal of the set and the actual earth connection.

That will not stop the chassis of the set being alive in regard to earth. It will always be the case, I am afraid, owing to the fact that the mains are earthed on the positive side and therefore the chassis of the set is probably some 200 volts below earth potential.

The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article.

All Editorial communications should be addressed to the Editor, "Popular Wireless," Tallis House, Tallis Street, London, E.C.4.

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4.

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialties described may be the subjects of Letters Patent, and the amateur and the Trader would be well advised to obtain permission of the patentees to use the patents before doing so.

HERE'S ONE FOR YOU

A. G. H. (Bedford). *—I use a crystal set for night listening in bed, and I have it nicely set to R 9 until the neighbours come home. As soon as a switch is switched next door the humble crystal goes dead. Why? It goes off exactly when the switch is used and I am left without reception.*

A very loud atmospheric will do the same—it's very annoying.

I should think that the switch mentioned is an electric light switch, and it causes a surge in the crystal circuit which desensitises the crystal. The atmospheric will do the same, but it should be possible in that case to readjust the crystal so that reception comes back.

If that does not take place there is a possibility that in the case of the switch there is a circuit put into use next door that blankets the reception of the crystal by shielding the aerial. As you do not say what sort of aerial you are using I cannot be dogmatic about this.

I am rather inclined to the first explanation, but of course it may be right up the wrong street. What do readers think about it, anyway? Umpteen heads are better than one.

THANK YOU!

H. O. F. (N. Wales).—"*With reference to the reply to G. E. P. (Bungay) recently the volume dropping in S.T.800 case (page 522 in "P.W." August 7th) I have had the same trouble. I traced it to the ingenious but faulty switch, and the remedy was taking it to pieces and cleaning and adjusting it. But what a business it was! I had to spend hours on it. Afterwards I found that all one need do is to take out the centre screw and remove cover* CAREFULLY *and clean the contacts.*"

This reply may help others who suffer from similar trouble.

S.T.400's

Will kind readers please get in touch with the following fellow constructors if they can lend or sell them blue prints of the battery S.T.400? H. S. Broadhead, 29, Northorpe Lane, Mirfield, Yorks. H. S. Biggerstaff, 37, Newport Road, Balsall Heath, Birmingham; *and* A. Beattie, 20, York Street, Barrow-in-Furness, Lancs.

All these want blue prints, so please drop them a card. Thank you.

SOS

Blue print of S.T.600 wanted by Harold Thomas, 15, Webb Street, Stapleton Road, Bristol, 5. *Cards first, please.*

H.T. IN PARALLEL

L. G. D. (Brighton).—*I have a mains unit which gives 150 volts and 20 milliamps. I want to increase that to 150 volts and 30 milliamps. Can it be done with a battery?*

Yes, by connecting a battery in parallel with the mains unit (the two positives and two negatives together). The battery should be of 150 volts and 10 milliamps capacity, but you must realise that the mains unit is a mixture of resistances and chokes and it may well be that there is a potentiometer scheme inside which will form a high resistance path for H.T. In that case your battery will gradually leak through the mains unit to earth (or H.T. —).

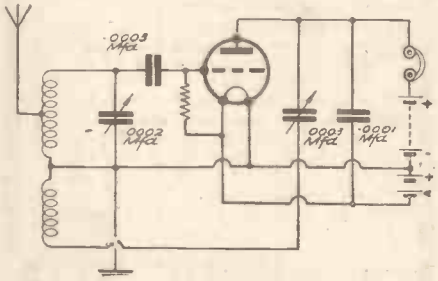
You should test the amount of this leakage (if any) by connecting a milliammeter in series with the battery and the connection to the mains unit at the positive end. Connect the two negatives of the unit and the battery together and then the two positives, but insert the meter between them. Test with the set off and you will see to what extent the battery will discharge through the mains unit.

If it is not more than a milliamp or so—and I do not suppose it will be—you can use the scheme quite well, for it will not waste the battery unduly when running the set. *But you should either disconnect the battery from the mains unit when you switch the set off* or insert a break switch that will enable you to disconnect the battery and mains unit when they are not required for working the receiver. If you omit to do this you will run your battery down through the mains unit all the time the two are connected and regardless of whether you are getting anything out of the set or not.

WHY IS IT?

Here is a problem perhaps YOU can answer. There is no prize for the solution.

J. G. H. (Blackwood, Mon.) writes: *I have a one-valve set just built with home-made coil of 23 turns grid and 11 turns reaction on 1½-inch former. I connected the set up to aerial, earth and L.T., but on plugging in 60 volts H.T. I got only crackling. I removed the plug to increase the voltage when I heard music. The eliminator used for H.T. was then removed altogether—still I received music. Then I disconnected the L.T. and the music still continued.*



This is the type of circuit used by J. G. H. (Blackwood).

I have had the set working for two days now without H.T. or L.T., and have found that the station received is an English one by day and Radio Normandie by night and early morning. Can you explain this?"

Well, can you? I can't. It might be that the valve is passing H.F. to the ·0001 condenser, that this is leaky (and caused the crackling), and that the condenser, being faulty, is working as a bad crystal set. But the tuning obtained with a 23-turn coil does not seem to give the right wavelength, to my mind, to enable him to get Radio Normandie. Is he getting a harmonic? If so, what is doing the rectifying?

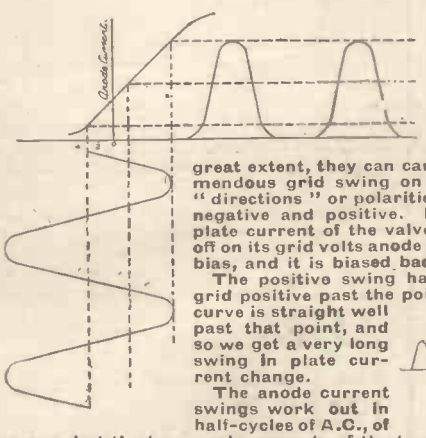
Put your thinking caps on and let us have your ideas of the solution.

BACK NUMBERS

Readers who require Back Numbers of POPULAR WIRELESS *should apply to the Back Number Dept., Amalgamated Press, Ltd., Bear Alley, Farringdon Street, London, E.C.4. The price is 4d. per copy, post free.*

TECHNICALITIES EXPLAINED—No. 64

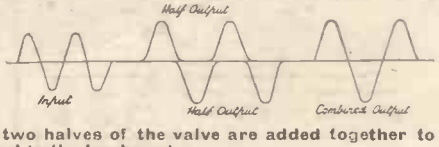
"CLASS B" AMPLIFICATION



You all know what a Class B amplifier is, but perhaps you do not understand exactly what happens in the valve. Each half of the Class B valve works alternately with the other half. It is supplied with grid impulses in the same way as a see-saw is worked. When one valve grid goes up (positive) the other goes down (negative) and vice versa.

But owing to the fact that the valves are designed to run into grid current without producing distortion to any great extent, they can carry a very big grid input. So we get a tremendous grid swing on each valve, and it is applied in alternate "directions" or polarities; that is, it swings in proper A.C. fashion negative and positive. But the negative part does not affect the plate current of the valve because the valve is so made that it cuts off on its grid volts anode current curve at about 4 volts negative grid bias, and it is biased back to that point to start with.

The positive swing has a big effect, however, and it sends the grid positive past the point where grid current begins. The anode curve is straight well past that point, and so we get a very long swing in plate current change.



The anode current swings work out in half-cycles of A.C., of course, but the two anode currents of the two halves of the valve are added together to form an A.C. total plate current which is fed to the loudspeaker.

SEEN ON THE AIR

By L. Marsland Gander

This week our special radio-screen correspondent discusses an interesting demonstration of big screen television

I WAS privileged the other day to be among those who saw the new big screen television evolved by the Philips' Company at their Eindhoven laboratory. Lest it be thought that Dutch engineers can claim the full credit for this remarkable development, I should like to make it known that an Englishman, whose name I am not allowed to mention, played an important part. He was, in fact, present at the London demonstration which I attended; but anonymity is the firm's policy, and I have undertaken to observe it.

After all, in scientific research parts of the puzzle are nearly always pieced together by many hands, and so it is with television.

As readers of these Notes may recall, the new Philips' set shows a cathode-ray picture on a flat screen of ground glass measuring 20 × 16 in. This is almost exactly twice the dimensions of the average size of picture shown on orthodox cathode-ray receivers.

Readers will know that I am not in the habit of making extravagant claims, but it is my considered opinion that this is the best large-screen picture that has yet been produced anywhere in Europe on 405 or 441 lines. I had nearly said "in the world," but I cannot speak from personal knowledge of the American big screen results.

On entering a darkened room at the Charing Cross Road headquarters of Philips I was, for a moment, startled by the sight of a close-up so much larger than anything I had been accustomed to and so remarkably good. The illumination was much more satisfactory than pictures of similar size which I saw in Berlin, the definition and the outlines were better. Of course, the picture was green and sepia, not the ideal presentation; but the fact is that this picture, viewed at a distance of from nine to twenty feet, is every bit as good as some of the smaller screen pictures which I have seen. The screen is flat and does not have the slight curvature at the edges associated with direct-viewed cathode-ray pictures.

The Question of Size

At the distances I have mentioned none of the component lines could be seen. The demonstration illustrated one thing to me at once, a point which I have often made but will make again without apology, namely, that there is far more definition in these B.B.C. transmissions than we wot of. Before going to Charing Cross Road I had thought, "Yes, it may be so, but 405 lines is not sufficient." On leaving I am more than ever sure that we are not obtaining all that 405 lines can give. Certainly the definition could be improved somewhat, but I am sure that anyone with a slight experience of television reception who visits Philips' demonstration theatre at Olympia will have a big surprise.

The only point of doubt is whether this is not too large for the ordinary suburban drawing-room, and more the type of set for the vanishing Victorian mansion. The great screen of the super-cinema has done television a disservice by creating in the mind of the potential buyer the impression that Brobdingnags are the normal inhabitants of picture-land. But though well accustomed to the smaller screen in my home so that I now no longer notice its smallness, at the same time I had a more "comfortable" feeling when looking at the bigger screen from a greater distance.

I am waiting for somebody to explain this, because experts are never tired of telling me that if you stand at such and such a distance from a screen so big the angle subtended by the eyes is exactly the same as if you stand at such and such a distance from a larger screen. I hope this is lucid; on re-reading it looks about as clear as Southend mud. However, the point I am trying to make is that in the smaller drawing-rooms viewers will probably not wish to sit at a distance of nine feet from the screen. Therefore, there should be a ready sale for both types of set.

The cathode-ray tube uses the unusually high voltage of 25,000 on the anode, but there is an effective safety device, the whole of the high tension unit being enclosed in a metal-clad chamber with an interlocking door, which breaks the supply on being opened. Twenty-eight valves are used, twenty-three for television and five for a broadcast receiver which is incorporated.

Experiments With Coloured Screens

By the way, it is claimed that the miniature cathode-ray tube is simpler to make than a valve and that it has a life of 1,000 hours. Experiment is now being carried on by Philips with screens of different colour and of still larger dimensions up to four feet by three. To my mind, the colour is of minor importance by comparison with the fact that a most promising line of development has been opened afresh. There are three main types of television receiver; those that operate by electrical means exclusively, those that use optical and mechanical methods, and those that produce their pictures by a combination of electrical and optical methods.

This new Philips' receiver is in the last-mentioned category, and is the first representative of it to be seen here under working conditions. Those who advocate either electric or mechanical-optical systems may see in this receiver some of the virtues of both methods.

I almost omitted to say that the pictures which I saw at Charing Cross Road were picked up over the air from the B.B.C. station at Alexandra Palace, while the pictures shown in Berlin were either from an improvised transmitter in the Exhibition grounds or by land-line.

At the time of writing we are on the eve of Radiolympia, and a haze of secrecy hangs over the television exhibits, which, for most visitors, will be the main attraction of the Show. But that there will be some startling developments is now assured.

I believe, however, that manufacturing economies have been effected by using a smaller cathode-ray tube, and that sets with larger screens will maintain their prices.

When I first heard the proposal to build fourteen miniature theatres at Olympia I felt rather critical. An open side-by-side comparison of results was, I believed, what the public wished to see, whereas each of these theatres was to be devoted to the receivers of one firm. Thus a visitor would have to carry impressions in his mind's eye from one theatre to another, a most difficult performance.

But since visiting Olympia during the days of preparation I have been converted, because it will be possible in each theatre to present television as a complete home entertainment, a thing which cannot be achieved when spectators are formed in a "crocodile" and kept continuously on the move.

TECHNICAL JOTTINGS

(*Continued from page 620.*)

Selectivity can be improved in these circumstances, as I have mentioned before, by the simple process of putting a pre-set condenser (·0003 microfarad maximum value) in series in the aerial lead, but whilst this will do the trick in most cases it may not always be sufficient, and you will have to have an additional tuned stage.

An Extra Stage

For this latter purpose you can use a tuning condenser and screened coil similar to those which are already in use in the other tuned stage or stages. The grid terminal of the coil in the final H.F. stage should be connected to the fixed vanes of the associated condenser, whilst both are to be connected to the fixed vanes of the first tuning condenser in the set, this connection being made via a small fixed condenser; the exact capacity of this condenser depends on circumstances, but it will usually be 20 to 30 micro-microfarads. Of course, the aerial has to be disconnected from the original aerial terminal and connected instead to the aerial terminal of the coil in the additional tuned stage.

Amplifier Peculiarities

You may have noticed, when playing records through the amplifier, more particularly if you are using a very selective receiver, that there is a tendency for the higher notes to be emphasised, and you may have thought that this was some sort of accidental effect. In point of fact it is not accidental at all, but is due to the low-frequency and detector parts of the receiver having been arranged, in view of the high selectivity of the H.F. part of the set when used as a radio receiver, to bring out the upper register and so make up for the loss of the upper frequencies in the radio set. The radio set, being designed for very sharp tuning, will almost certainly use very efficient coils and quite probably bandpass tuning circuits, and it is all this that has the effect of cutting down the higher tones.

Making Up for H.F. "Defects"

The low-frequency part of the set, therefore, has to be designed so as to make up for what we may call, for the moment, the "defects" of the high-frequency part of the set. When the set is being used as a complete radio receiver these two effects counterbalance one another as, of course, they are intended to do, and you get a nice balance between upper and lower registers notwithstanding the very sharp selectivity of the H.F. intake of the receiver.

Upsetting Balance

When, however, you come to use only the low-frequency part of the set, for the purpose of amplifying the signals from the record pick-up, you are feeding-in signals at the mid-point, as it were, and using only one half of the outfit. Consequently you will find, as I mentioned, that the low-frequency part of the set which you are using may tend to emphasise the upper frequencies, this being designed to correct or counterbalance a fault which does not now exist with the electrical pick-up.

(*Continued overleaf.*)

TECHNICAL JOTTINGS

(Continued from previous page.)

Compensated Circuit

If, therefore, you are using what is sometimes called a "compensated" circuit you will find it a good thing to use some device for "correcting the unwanted correction." If the set is one in which provision has already been made for the pick-up, you will probably find that there is some sort of tone-control already fitted, the object of this control being to overcome precisely the difficulty which we have been discussing. This involves an additional control knob, which many people (including myself) dislike, so if you want to avoid the use of an extra knob you can put in a fixed tone compensator, which can be adjusted once for all, so as to overcome the effect we have been talking about.

Fixed Tone Control

For the purposes of a fixed tone control you will need a pre-set condenser connected up in parallel to the terminals of the pick-up; this pre-set condenser, by the way, should have a maximum capacity of ·0005 microfarad, and then you can adjust it until you get the best results. You may sometimes find that this simple arrangement does not work particularly well, owing to the condenser reducing the strength of the output from the pick-up; in such a case you may try using a choke instead of the condenser, the choke being connected in series with one of the leads of the pick-up.

THE TELEVISION SETS

(Continued from page 628.)

frequencies covered by the television sound.

The price of the instrument includes supplying and fitting a special television aerial, and twelve months' servicing. This, coupled with the fact that the set is simplicity itself to operate, should assure those with no technical knowledge at all that television is in no way unsuited to their homes.

SCOPHONY, LTD. In view of the unique mechanical nature of Scophony television receivers, and the large-screen pictures, considerable interest attaches to them. We have received a statement from Messrs. Scophony Ltd., and the following conveys the importance of its contents.

While a Scophony receiver for the Alexandra Palace transmissions has been produced, certain irregularities in the transmitted synchronising pulses made results not entirely satisfactory. Representations were therefore made to the B.B.C., and as a result a completely new pulse generating equipment is expected to be working within a week or two. All possible steps will be taken by the B.B.C. to see that when it is properly adjusted this new gear will satisfy Scophony requirements.

Thus Scophony regret their inability to demonstrate their home receiver, giving a 24 × 22 in. picture, at Olympia. Details of public demonstrations and marketing scheme, however, will be announced as soon as possible after the new Alexandra Palace equipment has been found to work satisfactorily

FOR THE SHORT-WAVE EXPERIMENTER

An ingenious scheme with many advantages

VALUE for money is something which everybody aims at, and the keen short-wave experimenter is no exception. These enthusiasts will be particularly interested in "The Pilot Short-Wave Experimenter," published by The Peto-Scott Co., Ltd.

In this publication will be found a complete range of short-wave kits, including an adaptor and a series of receivers, starting with a one-valver and graduating to a four valve H.F., det. and 2 L.F. There are eight different sets, and all of these can be built up on the one standard chassis and panel. The idea is that the experimenter can purchase the standardised panel and chassis and, commencing with, say, a one-valve set, graduate by stages to a powerful four-valver, with a fully tuned H.F. stage. This scheme has everything to recommend it, and obviously is the most economical method one can adopt.

A great point about this standardisation business is that no matter which set you choose to commence with you can at any time convert it to any of the other circuits by the simple process of purchasing a few additional components. Every chassis and panel is supplied accurately drilled, and each Pilot kit includes every single screw, nut and piece of wire, together with under and top of chassis drawings and full assembly and operating instructions.

Also free with every kit is an envelope containing sixteen wiring diagrams, eight theoretical drawings, a calibration chart and an up-to-date list of short-wave stations.

The kits listed in "The Pilot Short-Wave Experimenter" are offered at prices considerably below the total retail value of the various components contained therein. For £4 8s. you can purchase an all-in kit which includes every single item necessary for building any one of the sets described. The total cost of the components in the kit is £5 11s. 5d., so that there is a saving of 23s. 5d. by buying the all-in kit.

We have one of these Pilot short-wave kits at present undergoing test, and we hope to publish our report very shortly.

POETIC LICENCE

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to the limerick in our advertisement in your magazine, we have had several inquiries from your readers asking how, even with Fluxite, "London Nat." can be got on the "Short Wave." We shall be much obliged if you will intimate in your columns that our Tame Poet considers himself entitled to considerable poetic licence in connection with technical points.

Yours faithfully,
FLUXITE LIMITED.

Up-to-the-minute news concerning the radio industry

UNDER this heading we are dealing first with those new season's products, details of which arrived too late for inclusion in last week's "P.W."

* * *

LATEST McMICHAEL MODELS

The new McMichael programme for 1938 consists of thirteen instruments with, in some cases, alternative models for different mains supplies. There are six table models, five floor models, including consoles and radiograms, and two portables.

The Model 137 all-wave de luxe receiver has the new self-tilting giant dial showing station names three times their usual size, and equally visible whether the user is sitting or standing. Other features are high-quality period cabinet work and a special autographic logging surface on the dial.

This particular model is also equipped with twin loudspeakers, and on the short waves covers the waveband of from 16·5 to 50 metres. The price for the A.C. model is 16½ guineas.

For 14½ guineas there is the Model 372, the twin-speaker, all-wave superhet which is fitted with the Polychrome flying tuning dial. Another attractive set is the Model 375 radiogram, which has 6-watt output and twin speakers. The price is 29 guineas, or with automatic record-changing, 35 guineas.

The McMichael stand at Radiolympia is **No. 59.**

* * *

RIDCO SHORT-WAVE UNITS

The Radio Industries Development Co., Ltd., are showing the full range of their Ridco short-wave units in the stand of Messrs. R. Cadisch & Sons (**Stand T9**). There is a new "Ranger" model employing a triode-hexode frequency-changer and tuning from 12–60 metres in two wavebands. This unit has a large, fully illuminated, calibrated dial, and over fifty short-wave stations are indicated, being grouped into four columns, representing the 19-, 25-, 31- and 49-metre bands respectively. The price of the A.C. model is 32s. 6d. (less valve), and the A.C./D.C. model, which incorporates its own power pack, is 57s. 6d., including two valves.

There is also a new "Cub" model. This is an autodyne converter, and employs an ordinary triode valve. The waverange is 19–50 metres, and an interesting feature is the use of fixed reaction. The unit is suitable for any A.C. mains or battery receivers, and costs 19s. 6d. (less valve).

* * *

SOUND SALES' EXHIBITS

Sound Sales, Ltd., are showing a large variety of transformers and chokes, together with many new models especially designed for use with television receivers, on **Stand No. 89.**

One of the exhibits is a radiogram having an undistorted output of 6 watts, and housed in a special three-cornered cabinet which fits very snugly into the corner of a room. The lid opens like a grand piano and exposes a record-changer and a neat tuning scale. The cheapest model available is priced at £35, and incorporates a medium-range high-quality radio feeder unit, together with a straight line 4–6-watt push-pull amplifier.

P.A. enthusiasts will be interested in the new P.A. speakers, especially the metal diaphragm units and the new telescopic pylon, which is in reality a tripod with telescopic legs. A new lapel microphone, as well as a combined crystal microphone and line transformers, are also on view.

* * *

THE "OSRAM VALVE GUIDE"

The G.E.C. have for over ten years published annually a pocket reference book entitled the "Osram Valve Guide." This year's edition is full of valuable information concerning characteristics, applications, etc., of valves designed for broadcast reception. One of the additions to the latest edition is the new "international range."

There are numerous circuits which will interest the experimenter, as well as the pin connections of all types of valves. The "Osram Valve Guide" can be obtained free on request at any of the branch establishments of the G.E.C., or direct by writing to the head office, Magnet House, Kingsway, London, W.C.2. Every experimenter should get a copy.

* * *

ALL ABOUT METAL RECTIFIERS

The 1938 edition of "All-Metal Way," that well-produced little handbook on Westinghouse metal rectifiers for radio and television, contains all the data that one needs for using metal rectifiers, in addition to a whole heap of practical information covering the various aspects of mains supply units.

The booklet is profusely illustrated with circuit diagrams, and forms a valuable book of reference on this particular branch of radio. There is also a chapter on battery charging and another on the application of Westinghouse metal rectifiers in television receivers.

Another Westinghouse publication just to hand is one entitled "At the Correct Rate," and it gives details of the battery-charging equipment made by this firm. These publications are obtainable from The Westinghouse Brake & Signal Co., Ltd., 82, York Road, King's Cross, London, N.1.

AN ALL-WAVE EXHIBITION

(Continued from page 622.)

This particularly applies to the mains superhets. Of many of these it can justly be said that if there is a short-wave signal to be wrung out of an unwilling ether this will be done in a slick, effortless manner.

So much for the ordinary all-wavers. Quite a number were shown at the last Show. This year there are better ones and more of them. But there are also all-wavers that will tune down to the ultra-short waveband and thus take in the B.B.C.'s television transmission.

This may not be receivable even in good conditions beyond about 50 miles from a station, but soon there will be more stations. Sets not able to take them in will definitely miss something. The television programmes are far from being valueless in the absence of vision.

As a matter of fact, as POPULAR WIRELESS has several times pointed out, many of the items included in the television programmes are every bit as good as those heard on the medium and long waves, even without the accompanying pictures.

In conclusion, we revert to our original theme. There is no wonder attached these days to the world-wide widening of radio reception. But there is still romance for some in listening to the programmes of far-distant countries. At the least, an all-waver gives you a greatly increased number of programmes from which to choose.

INDEX TO ADVERTISERS

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S.S.