

LOUD-SPEAKER HINTS AND TIPS

FULL DETAILS OF A SELF-CONTAINED TWO-VALVER

Amateur Wireless

Every
Thursday 3^d

and
Radiovision

Vol. XIX. No. 475

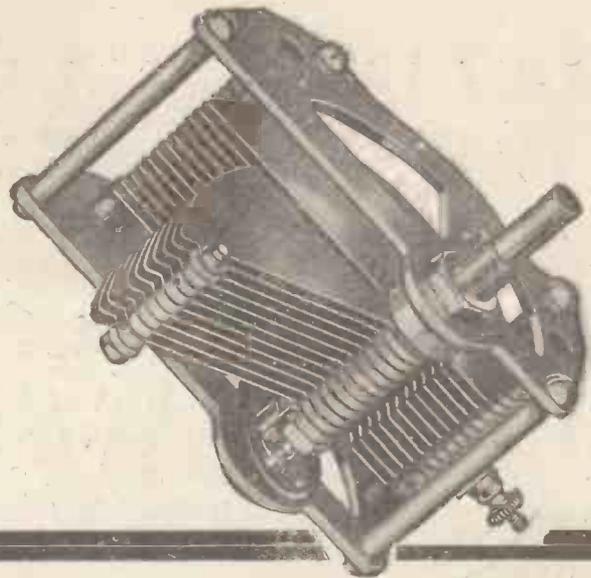
Saturday, July 18, 1931

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Progressive excellence of design and performance has built an enviable reputation for LOTUS Components. That is why all the leading radio designers specify LOTUS. They know from actual experience that LOTUS Components are reliable and will ensure the efficiency they themselves have achieved.

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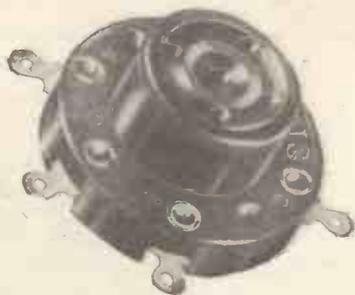
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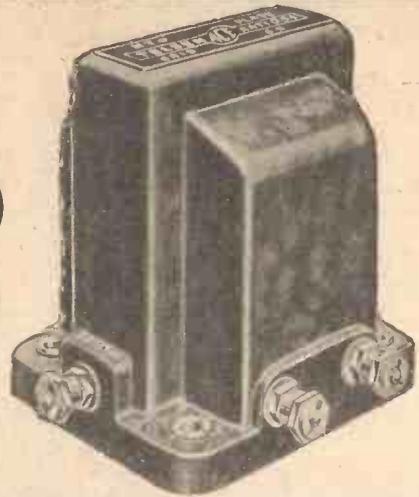
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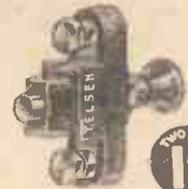
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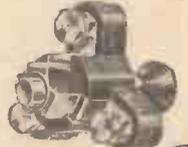
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TELSEN DUAL-RANGE H.F. COIL AND TRANSFORMER. This coil is designed for H.F. amplification in conjunction with screen-grid valves. It can be connected as a Tuned Grid or Tuned Anode Coil, or by removing a link, as an H.F. Transformer. This Coil also makes a highly efficient aerial coil where the adjustable selectivity feature is not required. Reaction winding is incorporated. When used as an H.F. Transformer the wave change is effected by means of a 2-pole switch. Price 5/6 each.

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THREE WAY
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7/6



THE TELSEN BINOCULAR H.F. CHOKE.—Has an exceptionally high impedance and low capacity resulting in an excellent performance curve. It has a restricted field and covers the whole broadcast. Free from parasitic resonances. Inductance: 180,000 microhenries. Self Capacity: .000002 microfarad. Resistance: 750 ohms. Price 5/- each.

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Mazda engineers introduce the first indirectly heated valve—1926. Made the all-mains set a commercial possibility.



Mazda engineers invent method of applying insulating coating direct to heater. Now universally adopted by valve manufacturers.



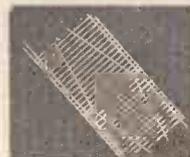
Mazda engineers introduce first indirectly heated S.G. valve—1928. And the first indirectly heated pentode—1930.



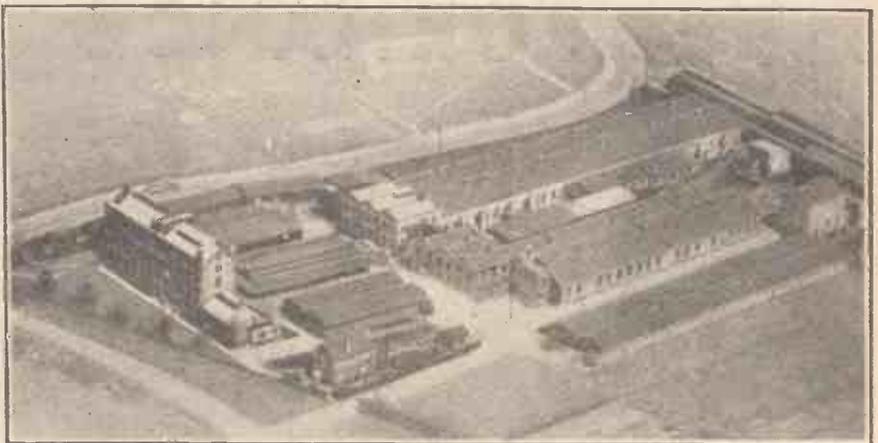
Mazda announce the new Unitary Structure principle and so ensure absolute uniformity of characteristics.



Mazda introduce anti-microphonic filament supporting books and produce the first really non-microphonic battery valve.



Mazda market the first D.C. mains valves already standardised by leading set makers.



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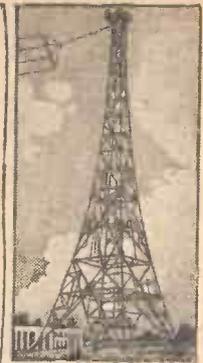
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and
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BRITAIN'S LEADING RADIO WEEKLY
FOR CONSTRUCTOR, LISTENER & EXPERIMENTER.

RESEARCH CONSULTANT:
W. JAMES.

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H. CORBISHLEY.

NEWS · & · GOSSIP · OF THE · WEEK

OUR SUCCESSFUL PORTABLE
"THIRD Time Lucky" is a truism which rather implies that the other two attempts have been unsuccessful! This certainly has not been the case with the "Century Super," for both the battery and mains models have been amazing successes and now the portable model—the third "Century" introduced to AMATEUR WIRELESS readers—is proving just as popular. In this issue will be found further detailed operating notes and an account of an interesting European station search with a "Century."

FOR THE SMALL SET LOVER
FOR the man who wants only a small set and likes to have it self-contained so that he can easily carry it from room to room without bothering about trailing battery leads, the "A.W." Technical Staff has produced a novel little two-valver,

known as the "Room-to-Room Two." Constructional details of this are given on pages 80-82. See it for yourself. Even if you already have a big set you might consider it worth while making up the "Room-to-Room Two" as a stand-by outfit. On account of its portability it has many advantages in the summer time over a big set, not of the transportable type.

THE MANCHESTER EXHIBITION
AFTER the National Radio Exhibition at Olympia comes the eighth Northern National Radio Exhibition, held at the City Hall, Deansgate, Manchester. This year the Manchester show will open on Wednesday, October 7, and will run for ten days, closing on Saturday, October 17. AMATEUR WIRELESS and the *Wireless Magazine* will, of course, be there for the help and guidance of Northern readers visiting the Exhibition.

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HOW SPORTS O.B.s ARE DONE



This is the American method of broadcasting running commentaries of sports events. Ted Husing, a popular sports commentator, is here at the microphone with the controls for the signal lights and other microphones on the field. Assistant commentators can thus link up with the main microphone

A GOOD IDEA FROM BIRMINGHAM

THE City of Birmingham Information Bureau is to be congratulated on launching a scheme which is not only of great assistance to amateur transmitters, but which brings the city to the attention of people all over the world. Amateur transmitters the world over have a system whereby special cards are sent confirming long-distance communications. These cards for amateur transmitters in Birmingham are supplied by the Information Bureau and bear a special Birmingham trade mark with a slogan. About two hundred cards are sent every week by Birmingham amateurs to radio enthusiasts in other countries.

STATION CHANGES—

WHEN the new Langenberg transmitter increases its power to 75 kilowatts, the present Cologne transmitter will be closed down and transferred to Treyes. Although the range of the new Langenberg station will extend far beyond Cologne, it is not expected that it will interfere with the transmission of the Treyes station. On the other hand, however, it is expected that Treyes will prove to be the better station for listeners in the Southern Rhine provinces.

NEWS · & · GOSSIP · OF THE · WEEK —Continued

—AND THE CONTINENTAL RELAYS

NOTHING has as yet been decided in connection with the fate of the relay transmitters at Aix la Chapelle and Munster. Before coming to a definite decision the authorities prefer to await the performance of the Langenberg station. It is hoped that this station, the construction of which is now being pushed forward, will be ready to operate before December 15, so that the first transmission may take place on this date, which happens to be the fifth anniversary of the inauguration of Radio Langenberg.

DIFFICULTIES IN AMERICA

WE are not the only country in the race for high-power broadcasting. Several of the more important American stations are seeking to increase their power to 50 kilowatts. This cannot be done without permission of the Federal Radio Committee, who recently gave permission for a maximum of twenty stations to use this power. As there are at least twelve 50-kilowatt transmitters now operating, it means that only eight more stations will be able to have the higher power.

PROGRAMME EXCHANGES

WE should not be left behind in the plans for international programme exchanges. Arrangements have been made for the regular exchange of programmes between Austria and Germany. For the purpose of programme exchanges, the various independent broadcasting authorities which are now operating in Germany combine as a whole, and in Austria the Ravag takes over the Austrian organisations. To consolidate the arrangements thus made, Eric Kuasti, Director of the Austrian Radio Service, recently toured Germany, when he discussed the make-up of various programmes.

"DISTRICT" PUBLICITY

SEVERAL novel ideas are being adopted in the Germany-Austria exchange. It has been decided that the more beautiful parts of Germany and Austria will be discussed before the microphone in the form of radio reports, these transmissions being taken by all German and Austrian stations. The propaganda value of these programmes is further enhanced by the fact that the transmissions will be passed on by the Zeesen short-wave transmitter. Arrangements have also been made with the National Broadcasting Co. of America for that company to re-broadcast over their chain of stations. For their part, the N.B.C. of America will arrange special programmes for transmission to Germany and Austria.

AT LAUSANNE

THE International Broadcasting Union has just finished its conference at Lausanne. The importance of what went on at this meeting cannot be over-emphasised because although there are a number of other meetings of broadcast authorities still to take place (the International Convention of Madrid in 1932, for example) it is to Lausanne that we must look for any

changes in the present scheme. Smaller matters such as the arrangement of European concerts and the reduction of man-made static were dealt with, but it was the wavelength problem and the Prague plan in particular which took up the members' time.

A 12-KILOCYCLE SEPARATION

IT was agreed by all the nations present that the Prague plan is turning out to be a failure, chiefly because it requires only a 9-kilocycle separation between stations whereas the general increase of power and the re-shuffling of wavelengths has necessitated a wider separation than this. All the Union members were unanimous that a separation of 12 kilocycles is needed, but a trouble has already arisen because this means scrapping some 15 available wavelengths out of approximately the 105 now available, in order to accommodate the wider spacing between stations. There was much argument but no final decision.

THE B.B.C.'s OFFER

THE B.B.C. sportingly offered to give up two wavelengths if that were necessary, provided other nations would do the same. Unfortunately, the other nations were not so accommodating, and Germany, in particular, wanted to retain all its stations and yet have a 12-kilocycle separation. The Union members came to the conclusion that Governmental assistance would be necessary and it was decided to wait until the autumn when a new conference would be held at Berne. So we may expect, in October, a Berne plan to take the place of the Prague plan and there will then be a wider separation between stations.

THE ADMIRAL AGAIN

VICE-ADMIRAL CARPENDALE, of the B.B.C., has again been elected President of the International Broadcasting Union. Arthur Burrows, formerly "Uncle Arthur," is the Secretary. Both these officials have held these positions since the inception of the Union. Other nations may think that this weights the dice in Great Britain's favour, but a little examination of what the B.B.C. has had out of the Union in the way of wavelength concessions shows that this is a big mistake.

BUYING BROADCASTING HOUSE?

A CORRESPONDENT in the City says that the B.B.C. is selling some of its stock to the tune of £100,000 or so. From another source comes a rumour that the B.B.C. is making negotiations for a fairly large loan. Putting two and two together, one is fairly safe in concluding that the B.B.C. is going ahead with its plans for purchasing Broadcasting House from the syndicate which is erecting it. The B.B.C. at present has a form of hiring arrangement with the syndicate and it is not compelled to purchase. But there are several good reasons why the building should be the actual property of the B.B.C. and it looks as though this huge deal will soon be completed.

DECORATING THE STUDIOS

WE learn that, following on the decision of the B.B.C. to allow each separate department to decorate its respective studios, tenders are being invited for the decorative work. A new feature is the religious studio which is to be fitted out in ecclesiastical style with a Norman arch and an altar table forming part of the scheme.



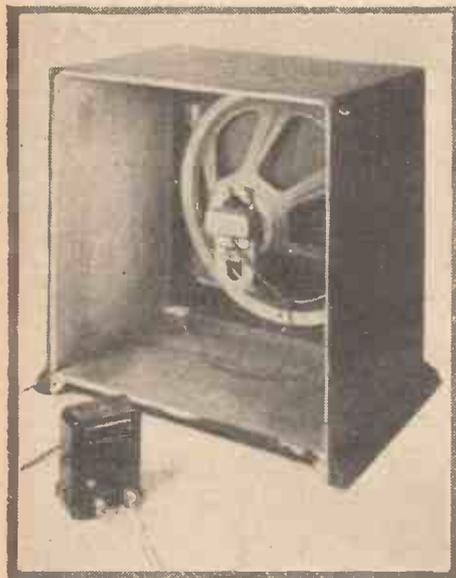
THE GIRL FRIEND: "I imagine your brother is quite an expert on wireless."
THE SISTER: "So does he!"

LOUD SPEAKER HINTS & TIPS

MOST speakers deteriorate in performance after a while owing to loss of magnetism. This fault makes its presence obvious as a rule by causing the diaphragm to rattle on strong notes in spite of any adjustment which may be made to the pole gaps. Permanent-magnet moving-coils are also liable to this defect, of course, although owing to the high-quality steels now used it is usually not possible to notice any deterioration in magnetism over two or three years. Speakers with small magnets should be suspected if, after a while, the volume drops and the tone is not as good as when the speaker was new.

Changing the Tone

After a time you may become dissatisfied with the natural tone of your speaker. There are several things which may be done to alter the tone either to increase the high

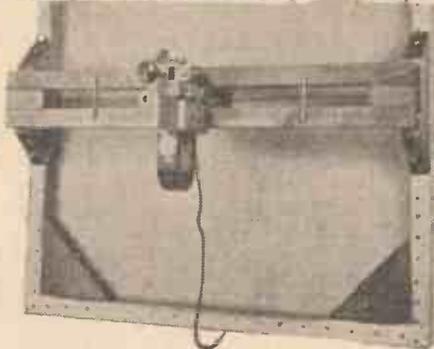


"No speaker can give its best unless insulated from the high-tension current." Here is a speaker fitted with an output transformer

note cut-off point or to boost the bass. No matter what type of unit may be fitted to the speaker you can change the tone by doping the diaphragm with some preparation such as collodion or amyl acetate. Alternatively, a heavier cone may be tried. Fitting a fixed condenser across the terminals of a speaker will have the effect of cutting off the high notes and this may be a great advantage for gramophone working where the presence of the condenser cuts off enough of the high notes to reduce needle scratch.

Fitting a Volume Control

Never fit a volume control across the speaker terminals. This is quite the wrong place for it. Not only will it be found difficult to connect the control so that it does not change the tone as the knob is



turned, but also as the resistance and the volume control will have to carry part of the high-tension current it may break down after a while and cause crackling noises. The proper place for a volume control is, of course, immediately following the detector valve.

The Effect of a Baffle

Many high-performance speakers are spoiled because they are worked without an effective baffle. A very large baffle is not always needed, but it should be effective acoustically. A baffle box, with an open back, is frequently just as effective in getting good reproduction of the low notes as a large rectangular baffle.

Speaker Position

Do not be satisfied with the performance of your speaker until you have tried it in several positions in the room. Frequently you find that more pleasing results are obtained when the speaker is comparatively high up so that there is a certain amount of sound reflection from the ceiling. The same reproduction is obtained, of course, when the speaker is low down near the floor, but a certain amount of naturalness is lost. The corner of a room is often a good position for a speaker owing to the deflection caused by the converging walls. Moreover, the corner of a room is frequently a convenient place for a baffle board.



"Never fit a volume control across the speaker terminals. This is quite the wrong place for it"

Fitting a Filter

No speaker can give its best unless it is entirely insulated from the high-tension current. This advice has been given often, but there are still amateurs who shirk the small job of fitting a filter output. If you do not want to go to the trouble of making an output unit, comprising an L.F. choke and a 2-microfarad condenser, then buy a tapped speaker transformer which can be connected directly to the set's speaker terminals and to the leads of the speaker. The output choke or transformer will pay for itself over and over again in the way it saves demagnetisation of the speaker and in the better tone it gives.

Take Care of Polarity

Many modern speakers are so wired that it does not matter which way round the input leads are connected. In addition, of course, if a filter is fitted, the difficulty of ascertaining polarity is solved at once. With some old type speakers, however not



"You can change the tone by doping the diaphragm with some preparation such as collodion or amyl-acetate"

fitted with an output unit, it is very important to get the polarity correct, for otherwise the speaker's unit will be demagnetised in a short while by the steady high-tension current flowing through the power valve.

Insulating the Speaker Wires

While most set users take care to keep the battery connections neat and the aerial lead as short as possible they often overlook the importance of neatly arranging the speaker's input leads. These carry pulsating A.C. current (and in addition a small steady D.C. current if a filter unit is not fitted) and there is always the possibility of induction. Not only can mains hum be picked up in this way if the speaker leads are not kept short and direct, but also a whistle may be set up in the set itself if the speaker leads run near to the aerial and earth wires.

K. U.

THE ROBOT VOICE

How Artificial Speech can be Made

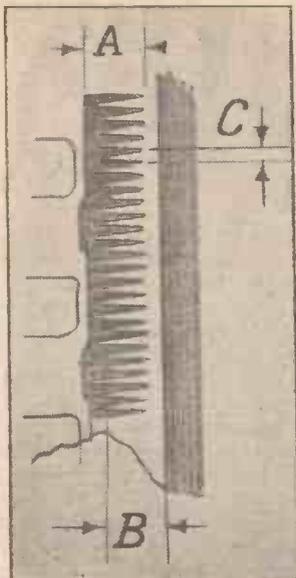


Fig. 1
An artificially produced sound track of a locomotive whistle

that we are able to isolate the series of sounds which, by proper combination, can be used in the formation of words, sentences, and finally, in dialogue.

Mr. Humphris has already done this and has succeeded in actually drawing a sound track on a large sheet of paper which afterwards is photographed and suitably reproduced upon celluloid film and run through a camera projector in the normal manner. The first words made up were "all of a tremble" and they took some 100 hours in construction.

Fig. 1 illustrates the whistle of a locomotive as embodied in a variable-width sound track. The loudness of the sound is determined by the ratio of black to white, in other words, by the lengths A and B. The pitch of frequency of the sound is fixed by the wavelength C. Now, once knowing these values, it is clearly possible to construct by measurement a new sound track, in which we can either change the pitch of the whistle or increase it or decrease it in loudness. If this be drawn, say, fifty times full size on paper, it can be reduced by photography so to eliminate the minor errors of construction.

The Synthetic Voice

For vocal sounds the question is distinctly more complicated. Fig. 2 illustrates what might be taken as a particular sound. Examination shows that the photographic sound-wave consists of a series of major peaks on top of which are superimposed smaller wavy variations, the large peaks constituting what are known as fundamental frequencies while the smaller

waves are known as harmonics; the latter giving characteristics to speech which enable one voice to be distinguished from another. While, therefore, it is comparatively easy to produce a robot voice containing only fundamentals, it will be a much more difficult matter to furnish it

with suitable harmonics in the shape of tiny peaks on the major waves.

The fundamental frequencies of ordinary speech range roughly from 80 to 1,200 cycles, while the harmonics may come as high as 10,000. The robot voice possesses few harmonics and is truly speech shorn of all emotion and feeling, as a robot should be.

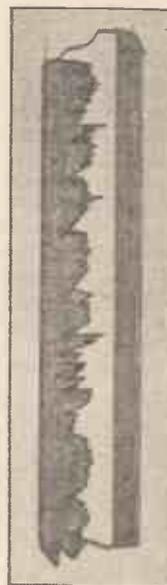


Fig. 2
The sound track of a "made" voice

What commerce will do to this new invention in the future is difficult to imagine, but it is possible to conceive a machine which by simple pressure of the proper phonetic keys, will produce a voice record. It would even be possible to develop both fundamentals and harmonics of a great singer and incorporate these as the keys of our gigantic voice typewriter. An operator would then be able to produce records of songs which a prima donna never sang.—B. BROWN.

MR. FLEX CALLS ON A FRIEND—



—WHO BELIEVES IN LIGHT PROGRAMMES



EUROPE IN AN EVENING WITH THE CENTURY SUPER

The following is an account by a North of England reader, who describes himself as "a language fiend," of an evening's experience with the "Century Super." He says that it is the ideal set for the student of languages as it enables all the worth-while stations clearly to be separated.

At first I was rather sceptical about the "Century Super," having had so many disappointments with commercial sets guaranteed to receive weak stations clear of louder neighbours. Then, finally, my dealer collected the parts, and the battery-operated "Century" was assembled, wired, connected to its batteries, and switched on one night when dusk had fallen.

Getting the Bearings

My own local station—Newcastle—provided the necessary reference points on the condensers. A few degrees turn downwards, and in came the voice of the Heilsberg announcer. "Meine Damen und Herren," he said, "das Orchesterkonzert aus Heilsberg ist beendet; wir machen eine Pause von fünf Minuten" ("That concludes the orchestral concert from Heilsberg; there will be five minutes' interval"). Still farther down, near zero, and more talking, which sounded like "dya gorovny istchestky dlya nstovitch," and there was no mistaking the

A few degrees above the Newcastle position, and I heard, rather faintly, gramophone records from Hilversum, then, after an interval, the welcome bilingual announcements from Strasbourg, the rich and mellow "Radio Wien" from Graz, and "Sudfunk-Sudwest-funk" from Mühlacker.

A very troublesome howl, which I could only trace to my set, interfered with Mühlacker, until I hit upon the idea of bringing that station in on the alternative dial readings. Incidentally, I found that other stations caused the same faint howl, and I found the best way to tune it out was to put the reaction full on and move the frame condenser until the station is stable.

Perfectly Clear Speech

The "Hier ist Hamburg und die Norddeutscher Sendergruppe" ("Here are Hamburg and the North German group of transmitters") announcing a late concert, came in clear of Mühlacker or Toulouse (impossible in my old mains set). Then, while Midland Regional was busy with

Jack Payne and his band, the clear-speaking announcer of Sottens was giving late news in French. Followed Katowice relaying a concert from Cracow, then Stockholm closing down, and Rome concluding an orchestral concert. Beromünster had closed down, so I bagged the last of an opera from Langenberg, skipped the North Regional, got Brussels and Vienna, both clear of each other and, finally, Riga and Budapest. Further search a little later brought in the melodious voice of the lady announcer from Milan: "Radio Milano-Torino-Genova," it said, "Gior-

nale Radio" . . . then news and sports notices and racing results.

On the long waves, Kalundborg, Scheveningen Harbour, Eiffel Tower, 5XX, Königswusterhausen, and Radio Paris are daylight stations and, at dusk, Warsaw comes

in so loud that the volume control has to be nearly off.

I have never heard French spoken so well as I now hear it from Radio Paris any time of the day; no need to strain to catch the sounds, which is a very difficult matter when listening to French. It is the same with Königswusterhausen, which comes in quite free of 5XX background. In fact, the only jamming is between Eiffel Tower and Warsaw on the long waves and Mühlacker (occasionally) and London Regional. Some readers may find, as I have done, that the coils (Wearite) are so calibrated that it is impossible to tune in anything above Budapest on the medium-wave band and Radio Paris on the high waves.

Other nights were spent in trying to bring in some of the less powerful transmitters and, although many were received, I usually found the background noise too troublesome to hear speech clearly. However, there is not much object in being able to get all the relay stations, which usually transmit the same programmes as the more powerful relay stations. The main value of the "Century Super" to me, a "language fiend," is that it enables all the worth-while stations clearly to be separated, gives clear speech and musical reproduction equal to, say, a straight three. It is the ideal set for the language student or linguist who, in the winter evenings, will be able to tune in to any of the main stations and hear speech in practically every European language that matters. One outstanding event in my experimental listening was to hear Government speeches from Barcelona on Saturday, June 27. Every remark was clearly heard, and even the comments and cheers of men and women.

A Tuning Point

There is one point about the tuning of the "Century Super" that calls for some explanation. The condenser settings are so critical that very delicate adjustment is sometimes required to bring in the voices absolutely clear and natural. This final adjustment I usually make with the frame tuning condenser. Some condensers have a certain amount of "slip" or play and, even when set in the proper position, are inclined to slip back or forward a millimeter or so. A big multiplication and smooth slow motion are desirable.

E. SINCLAIR.



The battery model of the "Century Super" as used by the writer of this article

station—Wilno—because the announcement came from the lady at Warsaw.

In succession came news from Nürnberg, the tail-end of a piano recital from Leipzig, Hungarian music from Turin, and choral singing from Moravska-Ostrava.

THE HOW AND WHY OF RADIO—XLV

LIGHTNING'S CONDENSER ACTION

Written specially for beginners who want simple and practical explanations of the underlying principles of radio

THIS week I am telling beginners something about lightning—Nature's mass-produced electricity! Less than two hundred years ago nobody knew that lightning was an electric discharge. We even read

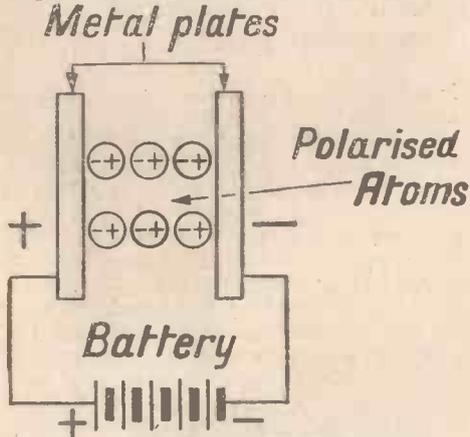


Fig. 1. Electrostatic field between two charged plates

that Benjamin Franklin, American pioneer of electricity, had the queer idea that lightning was caused by "the inflammable breath of Pyrities." But in 1749, several years after this remarkable pronouncement, Franklin drew many significant comparisons between lightning and electricity.

He had already experimented with electricity, having found that electricity is easily discharged by pointed conductors. Naturally, he wanted to know whether lightning behaved likewise, so he prepared the famous kite experiment.

During a thunderstorm he flew a silk kite, with an iron key tied to the anchored end of the string. As the thundercloud passed over he touched the key with the knuckle of his hand—and off came a fat spark!

Having thus proved that lightning is indeed an electrical phenomenon, Franklin applied this knowledge of electricity to lightning conductors. He knew that electricity passed most readily at points; he had proved that lightning was electricity; so he suggested that high buildings should be protected by lightning rods—as we commonly use to-day.

Even in those days America was ahead of us, for, whereas the first lightning conductor in England was fixed up in 1762, America had protected buildings by this means as from 1754! To-day we know, that in addition to making a lightning conductor pointed, it should have a large surface area and as few bends and twists as possible.

To understand the action of a lightning discharge one must know something of the electric field. Let me explain. Suppose

we have two metal plates placed parallel with each other, a fraction of an inch apart; and suppose we connect, as shown at Fig. 1, a battery to these plates; the negative pole of the battery to one plate, the positive pole of the battery to the other plate; the result of this connection is one positively charged plate and an equally negatively charged plate, the two opposite charges being evenly distributed over the surfaces of the plates.

Something invisible is created by this arrangement—lines of force, stretching from one plate to the other. Between the plates an electric strain is set up. For the intervening matter is composed of atoms, each of which consists of a positive centre or nucleus and an encircling group of negative charges, called electrons. The positive centres of atoms—nuclei—are attracted to the negative plate and the electrons of the atom, being negative, are attracted to the positive plate.

So far, so good; if the intervening material between the plates has what is known as a

high dielectric strength, the charging of the two plates will simply set up an electric strain among the atoms of the material—will polarise them in fact—but that is all. If the difference of potential is increased, it may so strain the atoms that the molecular structure of the material containing the atoms may be broken down.

When that happens there is a clash between the constituents of the atom, which, being oppositely charged, rush across in opposite directions. The clash is so great that heat, and sometimes light, is generated. So we get the familiar electric spark from a condenser. For the two plates, with the intervening dielectric, comprise a condenser.

What has all this to do with lightning? Everything, for Nature performs a similar sparking process when we see lightning. Then, as shown by Fig. 2, a cloud may become highly charged, either positively or negatively, and acts like one of the plates of Fig. 1. *The earth acts as the other plate!*

If we have a positively charged cloud it will attract towards it the negative elements of earth-bound objects. If the object on earth is pointed, as with a church steeple, it will readily conduct the electric charge of the cloud to earth. Under exceptional conditions, when the cloud is very highly charged, or the earthed object is not a very efficient conductor, the dielectric strength of the intervening air may not be sufficiently great—the air may "break down" and the cloud would thus discharge itself as a flash of lightning—the light being generated by the terrific friction between the colliding ions—that is, the oppositely-charged constituents of the air molecules.

HOTSPOT.

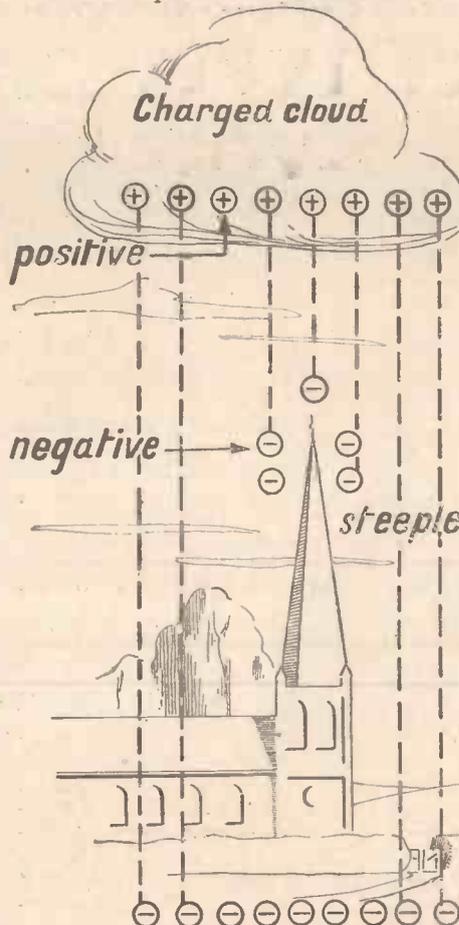
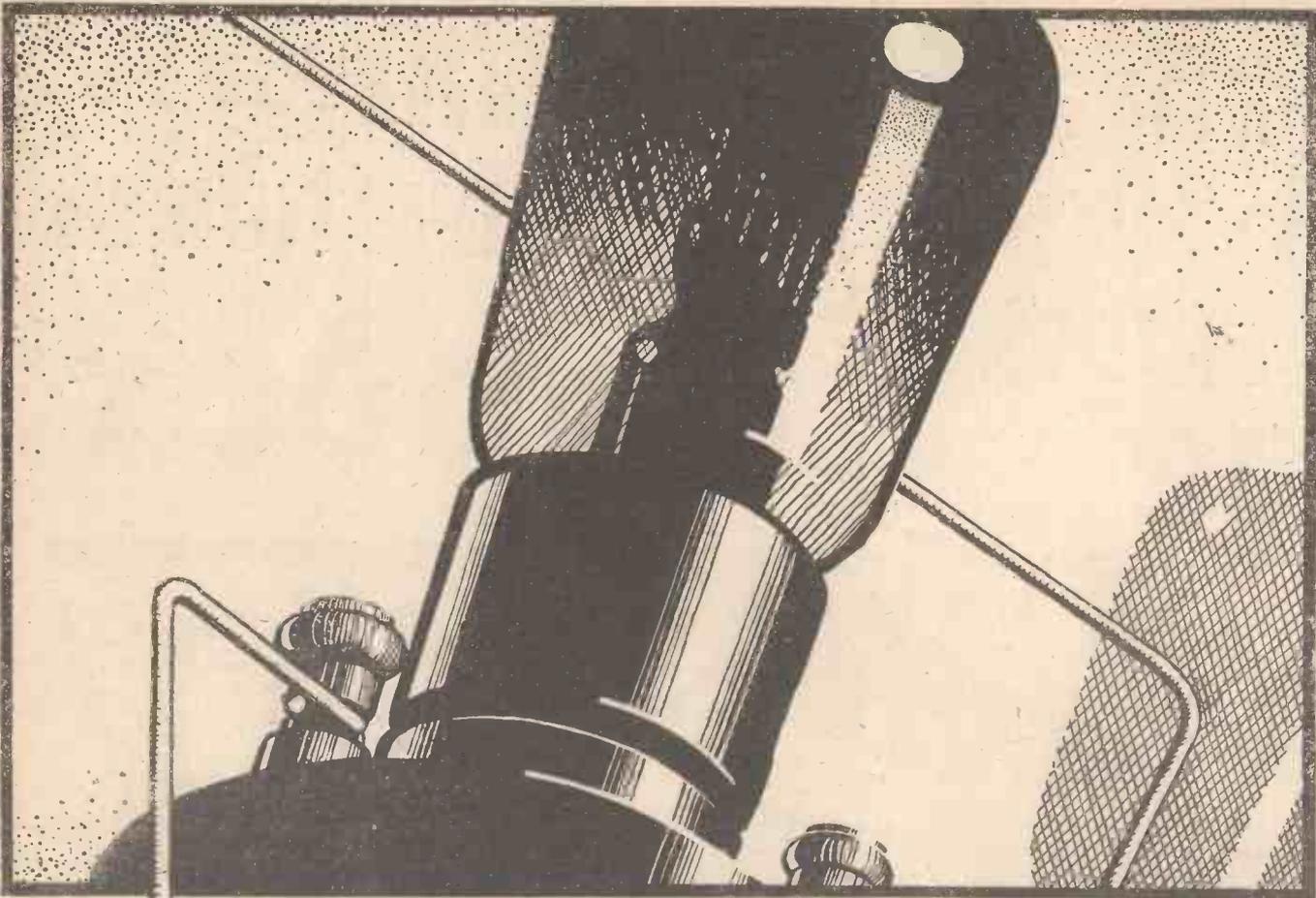


Fig. 2. The condenser action of a lightning discharge

ANOTHER "ESCAPE" BROADCAST

MOST listeners agree that the present "escape" series of talks rank among the most interesting ever broadcast. The only difficulty has been in getting private soldiers to broadcast, for mostly the privates did not have enough equipment to enable them to escape and only some officers were so fortunate. Now a good find has been effected in the shape of Ernest Pearce, who is a miner in Yorkshire and who managed to get away from a German Camp with no equipment, living for 12 days on practically no food and accompanied by a French soldier who had lost all his clothes! Pearce will broadcast on Bank Holiday Saturday, August 1.

The Stage Revolves will be broadcast in a second edition on July 22 (Regional) and July 24 (National), under John Watt's direction.



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Oh Your Wavelength!

SCREENING PROBLEMS

WE are so familiar these days with the screening of coils, etc., that we sometimes forget the little precautions which are necessary for their satisfactory use. I had a set the other day which was much too lively for me. I was quite unable to hold it down, although I tried decoupling the H.F. stage and by-passing, filtering, and all sorts of things. The annoying part was that when I adopted such drastic and obviously incorrect remedies as reducing the high-tension voltage all round, the set was still unstable until I got down to a ridiculous value like 15 volts.

I was just a little bewildered, because the set seemed to be alright. The condensers were adequately screened, the coils were enclosed in screening cans; and, indeed, the design was absolutely O.K. as far as I could see. Yet this instability still persisted and I could find no method of overcoming the difficulty.

A PECULIAR TROUBLE

AFTER a time, however, I noticed that when I placed my hands on the screens of the coils in order to make sure that they were fitting tightly, or in removing them, there was a distinct difference in the signal strength. Of course, if one takes a screen off, the tuning is completely altered, so that the signals fade out. But there should be no noticeable difference if one places one's hand on the screen when it is in position and I was getting a distinct reduction in strength. This struck me as peculiar and I started making further investigations. It was not very long before I discovered the root of the whole trouble. I had completely forgotten to earth the screens.

Enclosing a coil in a metal box, of course, does *not* prevent interaction. It may even introduce worse interaction than if the coil were unshielded, unless one takes the additional precaution of connecting the screen to earth. Usually one contact is sufficient to ensure that the screen is substantially at the same potential all over.

Obviously if the screen is not substantially at earth potential, it definitely produces interaction and makes the state of affairs worse than before. In my particular case, a simple connection of an earth lead from each of the screens put the whole trouble right, and the set behaved smoothly.

AN "OMNIBUS" AERIAL

SO much has been heard of local relays for distributing programmes to a circle of subscribers over low-frequency lines that it is interesting to see a somewhat similar proposal being tried out on the high-frequency side. The idea, briefly, is to use a single "omnibus" aerial to supply all the occupants of a large block of flats in such a way as to allow each listener his own choice of programme. The whole clue to the success of such a scheme lies in making both the outside aerial and all the feedlines leading from it to the various plug-in points

strictly aperiodic, so that all the "pick-up" frequencies are distributed at constant strength, i.e., no one particular programme is favoured at the expense of the other.

"SURGE" IMPEDANCE

THIS is a pretty ticklish business and involves the use of "surge" impedances at the end of each line. However, providing that the aerial and feed lines are properly designed, there is no reason why the system should not prove satisfactory in operation. The aerial is, of course, affected by every carrier-wave present in the ether, though the degree of choice, as regards programme, will naturally depend upon the range and selectivity of the receiving-circuit connected up to each plug-in point.

The main thing is that each listener can tune in to the station he prefers without interfering with any of his neighbours—though all are being fed through the same aerial system.

DIRECTION-FINDING

I HAVE always thought direction-finding one of the most interesting sides of radio technique. Of course, the principle of D.F. is based on the apparently simple fact that a frame aerial responds more energetically to waves reaching it end-on than to those which arrive broadside on. Unfortunately, this differential action appears to be handicapped by all sorts of things in actual practice.

The other day I was talking to a wireless operator home from sea. He told me that most of his trouble as regards D.F. was caused by re-radiation. All the steelwork on board the ship combines to twist the signal wave out of its proper path, so that the apparent bearing is very far removed from the true bearing. One peculiar thing he mentioned is that it is much easier to get an accurate bearing on a wave coming in from the bow or stern than it is when it comes from either beam. This is because the shape of the ship is symmetrical about a line fore and aft, though it is not in the other direction. In the first case the correction is comparatively simple, whilst in the second it is enough to give one a bad headache.

TELEVISION PROGRESS IN U.S.A.

VERY strong rumours seem to be current in America regarding new systems of television employing cathode-ray equipment. The cathode-ray tube is an adaptation of the ordinary valve, but the electrons emitted from the filaments are not stopped by the anode but are allowed to pass right through it. They are thus focused in a beam which strikes a screen at the end of the bulb in a small spot. Where the rays strike the screen it becomes illuminated so that by causing the spot to move over the screen in a series of vertical or horizontal tracks, and by switching the light on or off at the appropriate points, a luminous picture can be built up.

This arrangement requires no scanning disc at all, and the picture can be built up and "rubbed out" again more rapidly than is possible with any mechanical contrivance because the speed of motion of the electrons is practically instantaneous.

Cathode-ray tubes suitable for this purpose are being produced, so it is rumoured, at prices comparable with that of a medium-power output valve! Indeed, one of the American trade papers predicts that television will definitely take its place side by side with radio within the next year.

IS IT TRUE?

ACCORDING to this same paper, the Farnsworth apparatus will produce a brilliant four-hundred-line picture one foot square with signals only requiring a 10-kilocycle channel for their transmission. The interference produced, therefore, by such a transmission would be practically no greater than that of a modern telephony station. No separate synchronising channel is required, special non-interfering synchronising signals being transmitted over the same channel as the picture signals. It certainly sounds attractive and feasible. The cathode-ray tube has always to my mind been a more likely solution to the difficult problems of television than any mechanical arrangements, and we may see practical television earlier than most people think.

WORTH LOOKING AT

HAVE you, I wonder, glanced at the conditions of your wireless licence, or are you one of those who, having parted with the necessary ten shillings, just stick the licence on the bill file and leave it at that? Actually, the licence is a rather interesting document. Look at yours, and you will find nowadays that it authorises you to establish a wireless station for the purpose of receiving messages in your own house and, in addition—this is important—to work one portable wireless receiving set in any place in Great Britain, Northern Ireland, the Channel Islands, or the Isle of Man. Its clear wording removes many old-time doubts. It is plain, for example, that it is the station that is licensed, and not the wireless set; or, in other words, that one licence covers, say, a quality receiver, a long-distance set, and a short-waver. Also you can take your portable with you when you go for a holiday without paying anything extra for it. Note that, according to condition No. 2 on the back of the licence, nobody but yourself or a member of your household may work the portable and that you are supposed to carry your licence with you when you are away from home if you have a set.

INTERESTING POINTS

OTHER points of great interest are to be found in the conditions. In No. 4, safeguards are laid down for aeriols crossing overhead power wires. Condition No. 3

On Your Wavelength! (continued)

lays down that the licensee shall not use his set in such and such a way as to cause interference by energising other aerials, and there is a note showing how you can detect when your own receiver is oscillating. Lastly, there is a very sensible note on the front of the licence on the use of supply mains. This is to the effect that when power is derived from the supply mains, no direct connection shall be made between these and the aerial. The whole wording of the licence strikes one as extremely sensible, and readers will do well to point out to any beginner friends—and even to those who are not exactly beginners—the advisability of going carefully through it.

NEW H.T.B. STANDARDS

UNTIL the beginning of this year this country stood almost alone in having no standards for dry batteries. But now the British Engineering Standards Association has laid down definite minimum performances for dry cells and has devised an excellent method of testing them which does really show up good and bad points. The old method was to run cells or batteries through fixed resistances for six hours a day on five days a week. The battery was considered to be in good order until the voltage dropped to .75 volt per cell, and the result of the test went to show simply the number of hours of service given before this figure was reached.

GOOD OR BAD

A MOMENT'S thought will show that a bad battery, from the wireless user's point of view, might come through such a test extraordinarily well. What "kills" a dry battery is rising internal resistance. Now, if you discharge through a fixed external resistance, increased internal resistance cuts down the current flowing and, therefore, the load on the battery. Take the case of a high-tension battery with rapidly rising internal resistance. It starts, we will suppose, with an E.M.F. of 66 volts and a comparatively low resistance. The external resistance is so arranged that the normal starting current is 10 milliamperes. In a few hours the internal resistance has risen until the load on the battery is only 6 milliamperes. The E.M.F. is still well above the

cut-off figure, and under this small load the battery may go on for many days; in other words, the more rapidly the resistance of a battery rose, the better was its performance likely to be under the old testing system. And, vice versa, a really good battery might not give a proper account of itself in comparison, for, owing to the very slow rise in its internal resistance, it would remain under a heavier load much longer than the bad battery. Another point is that the cut-off E.M.F. of .75 volt per cell was far too low. Few wireless batteries are really fit to use when they have dropped very much below 1 volt per cell. In some cases poor batteries gave apparent long service under the old tests because they continued to supply comparatively small amounts of current when the E.M.F. was a little over .8 volt per cell.

THE NEW TESTS

IN the new tests an entirely different method is used. The load, and not the resistance, is kept constant. For a standard-capacity battery the load is 5 milliamperes, which is just about what it ought to be expected to stand. The load is maintained at a constant figure by means of a variable external resistance. You will see how excellent this part of the test is. Next the cut-off voltage is taken at .9 volt per cell, which again is just about right for wireless purposes. As before, the tests take place for six hours a day on five days a week, the voltage being taken at the end of each discharge period with the battery still under load. These readings are recorded on the chart, and at the end of the test it is easy to work out the total watt-hours for the battery. Dividing this total by the number of cells which it contains gives the watt-hours per cell.

THE STANDARD PERFORMANCE

THE Association of Engineering Standards has laid down that a cell of the standard-capacity size should give a minimum of 1.2 watt-hours; a treble (1 1/4 in. by 2 1/4 in.), discharged at 10 milliamperes, 3.5 watt-hours; and a super (1 1/4 in. by 3 1/2 in.), discharged at 20 milliamperes, 4 watt-hours. The only criticism that I have to make is that these figures are too low. Any decent standard-capacity cell, for example, should give something very much more like 1.5 watt-hours, and there are many that will do far better than this. Still, we have now a definite standard of comparison which does really show what the performances of a battery are.

CHRONIC FADERS

YOU may have been surprised sometimes to find that of two stations on wavelength quite close together and at very much the same distance away, one is fading badly whilst the other remains pretty constant in volume. By all the rules, they should show something like the same degree of fading, but they don't. I have been trying to find an explanation of this queer business, and I think that I have hit upon it. The number

of stations in Europe which use crystal or tuning-fork control to ensure keeping a constant wavelength is surprisingly small. The great majority—including, strangely enough, all of our own except the relays—have no such control, and the result is that they do undoubtedly wobble quite a bit. Now, if you are using a selective set, such as the "Century Super," your tuning is very sharp, and if the station you are receiving is not steady, it is liable to wobble into and out of resonance. When it arrives at resonance it comes in with a hearty roar; when it wobbles a hundred or two cycles above or below its proper frequency there is a noticeable decline in signal strength, and if the wobble is greater, as it not infrequently is, it may drop to a whisper or even disappear altogether.

THE REASON

THE truth of this explanation is very easily proved by receiving a chronic fader, first of all on a powerful but not very selective set, and then with a detector and note-mag. two-valver which has to rely a great deal upon reaction. With the big, rather broadly tuned set the fading is not very noticeable, if it is there at all. There is no sharp resonance point, and the station can wander a little bit up and down without going off tune. With the small set, though, the station is found to be fading to beat the band. Such a set, you see, shows up wobble more than any other, and here is the reason. When the station is dead on its wavelength, reaction has its full effect; but when the station drops below or rises above the correct figure the effects of reaction go down by leaps and bounds, and what is really a small decline in signal strength is magnified many times.

Wavelength wobbling is far more general than most people realise, and I do hope that at the Madrid Conference steps will be taken to make crystal or tuning-fork control compulsory for European broadcasting stations. If this were done listeners would have a two-fold gain. There would be less fading and there would also be less heterodyning, for a great deal of the mutual interference that now occurs is due to wavelength unsteadiness.

THERMION.

SHORT - CIRCUITING CONDENSERS

Before trying out any alterations to a set which has just been working, it is a good plan to short-circuit the large



fixed condensers with a screwdriver. These store current for an appreciable time, and if not "shorted" may cause an unpleasant shock.

KEEP PANEL COMPONENTS TIGHT

It is very annoying to find, when panel parts have been mounted, that



they turn with the dial. Always make sure that the one-hole fixing nuts are quite tight before the dials are mounted.

MAKING THE MOST OF MODERN TRANSFORMERS

Below are some interesting points regarding the modern transformer together with useful advice on making the best use of it.

NO one attempts nowadays to argue whether, for low-frequency amplification, transformer coupling is better than resistance-capacity coupling—we all use transformers now! Yet perhaps the older readers of AMATEUR WIRELESS can recall those heated arguments fought out in the early days of wireless reception, when transformers really were bad. I think their badness accounted for the brief popularity of the resistance-capacity system of low-frequency coupling. It was not that resistance-capacity coupling was really good, but rather that it offered a better chance of good-quality reproduction than could possibly be hoped for from a transformer whose frequency response began at 200 cycles and ended at 2,000 cycles.

To-day the detector is usually followed by only one low-frequency-amplifying stage, the output valves being coupled to the detector with a transformer. This is because a greater proportion of sets now in use employ three valves, one being needed for high-frequency amplification, leaving, with an intermediate detector, only one valve for low-frequency amplification.

In following the high-frequency, detector, and low-frequency valve sequence, many constructors, especially those not near a broadcasting station, have come to the conclusion that very often the post-detector amplification is insufficient to load the power valve. Many stations are readily tuned in, amplified at high frequency, and detected, but fail then to produce good loud-speaker volume through lack of sufficient build-up in the low-frequency stage.

Ratios and Amplification Factors

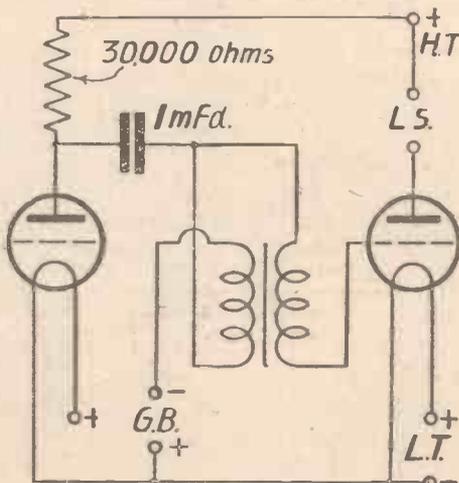
It is not always realised that the standard transformer ratio of $3\frac{1}{2}$ to 1 was really started when valves gave much less amplification than we obtain to-day. As the valve amplification was so small, two low-frequency-amplifying stages were always used, thus enabling the advantage of the transformer step-up to be obtained twice.

With the moderate amplification factors of the valves of three years ago, this $3\frac{1}{2}$ to 1 transformer ratio was ideal, providing in a two-stage low-frequency amplifier just the right amount of amplification, after the detection of a fairly weak signal, to load the power valve.

Now, of course, valves have really extraordinary high amplification factors, but not high enough, in many sets, to counteract the loss of the step-up transformer ratio when only one low-frequency stage is used. The question to be settled

is whether, with modern valves, the right amount of low-frequency amplification is best achieved by increasing the ratio of the single-stage transformer, or by decreasing the ratio so as to produce the required extra gain with two stages.

Well, there are transformers that will do both jobs. As an example, the Ferranti AF6, with a ratio of 7 to 1, would go a long way towards loading a normal power valve through a single low-frequency stage. Greater step-up than 7 to 1 is not recommended. If a higher ratio is attempted, it is found that quality suffers. But even when preceded by a fairly high magnification detector, this transformer ratio of



Circuit arrangements of parallel feed

7 to 1 may be insufficient to load the power valve for the reception of the required stations.

The only practicable plan then, is to use two low-frequency stages, with low-ratio transformers, otherwise the power valve will be overloaded. For example, the Ferranti AF7, with its ratio of $1\frac{3}{4}$ to 1, would be ideal for this condition, providing more amplification than would be obtained with a single high-ratio stage, but not the excessive amount of amplification that would result from two normal-ratio transformers.

Apart from the alterations to their ratios, transformers have progressively improved in frequency response, due to increased primary inductance and decreased secondary winding capacity. Some phenomenal reductions in transformer sizes have also taken place, as with the R.I. Parafeed and the Varley Niclet transformers. The use of a nickel-iron alloy instead of soft iron for

the cores is not new, but undoubtedly the latest midget transformers are a long way ahead of the first samples.

Any consideration of transformers is inseparable from valves. The latest valves all show much lower impedances than the valves of two or three years ago. Consequently, they pass more anode current. The amount of direct current flowing through a transformer primary has a very great effect upon its inductance.

So if we put a modern valve in front of a midget transformer we shall get saturation, and the same applies to most moderate-priced transformers, whose primary inductance is high enough to give good quality only when the anode current of the preceding valve is kept down to 2 or 3 milliamperes.

Parallel Feed

For this reason the parallel-feed system of low-frequency amplification has come into favour. The usual arrangement for parallel feed is shown by the diagram. In the anode circuit of the detector is inserted a non-inductive 30,000-ohm resistance, which diverts the low-frequency current through the 1-microfarad coupling condenser to the low-frequency transformer, whose primary winding is thus associated from the D.C. supply. The inductance, therefore, remains high and good quality of reproduction can be obtained.

One maker of the midget type of transformer reminded me that when the transformer primary inductance is high, and consequently notes below 100 cycles are reproduced, motor-boating is apt to occur. This is readily proved by anyone who cares to replace a non-decoupled cheap transformer with a really good sample. Motor-boating is then inevitable.

Thus, the parallel-feed system, though providing a better frequency response by virtue of a high effective primary inductance, is more likely to cause motor-boating than when the same transformer is used with straightforward connections. This is a point all constructors should watch—it is not at all widely known.

ALAN HUNTER.

JACK'S HOLIDAY

JACK PAYNE comes back from his holidays at the end of this week and will be heard again at the mike from July 20 onwards. The B.B.C. orchestra, the members of which are now also mostly on holiday, returns to work on the same date, and prepares for the Proms.



IN MY WIRELESS DEN

WEEKLY TIPS—
CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

Plug-in Coils

MANY people think that sets having plug-in coils are quite old-fashioned and no longer used. Actually there must be large numbers of such sets in use to-day.

Some people seem to like being able to change the coils, and published designs having these coils are surprisingly popular. There was a time when plug-in coils were considered poor electrically. Comparison was made with single-layer coils and it is certainly true that the single-layer coil properly made is most effective.

When dual range coils are made, however, some of the efficiency is lost in many designs. And so you will find that the somewhat old-fashioned plug-in coil is relatively not so bad.

Used in simple sets these coils are satisfactory enough for those who do not mind changing them when wanting to tune over a different waveband. I believe a number of people stick to one waveband, however, and so are able to save a fair amount on the coils.

Big Power Valves Needed

There is nothing like a good big power valve when quality is of first importance. Of course, the valve by itself is of no great use. The speaker must be a good one and it must be properly coupled to the valve.

A choke-condenser filter is all that is needed for this in many cases, but a tapped choke or a suitable transformer will often be necessary.

If these parts are not suitable the results will certainly be poor. I feel that many amateurs buy a fair-sized power valve expecting to find an immediate improvement in the results, forgetting that other matters may well need attention before the best results are obtained.

The high tension must be of sufficient amount and the grid bias suitable. A new valve having different characteristics from the one formerly used may alter the tone.

You never can tell, as loud-speakers vary so greatly in their characteristics. When you invest in a new valve, therefore, pay attention to all the little points mentioned.

The "Century" and Mains

The "Century Super" works very well with most mains units, but I have heard of one or two instances of failure to obtain the desired results.

In some of the older eliminators there appears to be not enough smoothing and the voltage-controlling apparatus is not good.

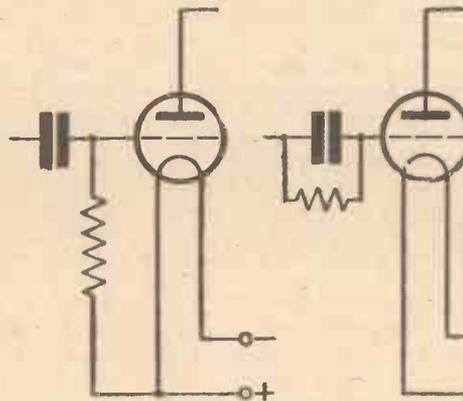
Slight variations in the output as the

result of a poor voltage regulating resistance may not matter much when the set is an ordinary three-valve one, but when a super-heterodyne is connected, having a relatively enormous magnification, the result is instability or noisy reception.

If you should be troubled in this way, the mains unit ought to be overhauled, as the set has been tested with various makes of standard mains units with good results. The set, is, in fact, no more liable to be troublesome with a poor high-tension supply, such as an old dry battery, than any ordinary set. This is due largely to the fact that transformer couplings are used for the intermediate frequency amplifier.

Connecting the Leak

It is the usual practice to connect the grid leak between the grid contact of the valve holder and the positive side of the



Two ways of connecting the grid leak—
from grid to filament and directly across
the grid condenser

filament, but sometimes you will see the leak joined across the grid condenser instead.

There is very little difference, really, in the results obtained from the two methods. My own preference is for the direct connection between grid and filament. The grid leak is then in parallel with the tuned circuit, along with the grid filament path of the valve.

With the alternative method the grid filament path is across the circuit as before, so there is not much difference in the damping produced in the two methods. It is usual, however, to connect the end of the tuning coil and the tuning condenser to the negative side of the low tension, so that this must be changed if the grid leak is fitted across the grid condenser. In tuned

anode and similar circuits the grid leak must be joined from the grid to the filament or the bias of the grid will not be correct. The grid circuit is one where standard connections might well be employed and there would be a saving as at the moment grid condensers are often provided with clips that are not used.

Remote Control

To be able to select one of, say, a dozen stations by operating a control from one's arm-chair sounds nice enough, but I doubt whether ordinary users would pay for a feature of this description.

If foreign stations are desired it is easier at the moment to tune them in at the set and then to select the best one.

Reception conditions are not so good that stations are consistently received, but the time may come when, with more powerful stations to choose from, it will be possible to receive them regularly at good strength.

With a powerful set, having good selectivity and sensitivity, the volume must be under control over wide limits so that both the tuning and the volume must be under control from the distant point. This is possible, at a price, and there are interesting systems available in America.

Judging a Pick-up

A fairly good idea of the worth of a pick-up is, of course, to be obtained by playing over a few well-known records. But much more can be learned by playing frequency records and you might well be surprised at the faults which are noticed and which you were not made aware of when playing the ordinary records.

If you are interested in pick-ups, test records are invaluable. It is better to use a valve voltmeter for showing the output from a pick-up than to rely entirely upon an amplifier and loud-speaker, both of which may have faults.

The valve voltmeter will show just how the output varies and if a scratch-filter is used in the amplifier, this may be included in circuit during one of the tests, as you will soon be able to judge whether it affects the output of the higher notes too much.

If a transformer is used between the pick-up and the set, or a volume control, the output may be noted with and without the extra apparatus in circuit. Considerable time can be spent in tests of this nature and you can learn much about pick-ups and the effect of various parts often used with them.

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour



ENGLISH OPERA

PROGRAMME CHANGES

DR. CHARLES B. BALL, writing from Barnsley, says that as a doctor he is constantly faced with the results of "dirt and drink." "I congratulate you upon the stand made by you in AMATEUR WIRELESS some time ago against radio 'dirt,'" he writes.

He refers to my recently having touched upon, in one small paragraph, the attempts at laughter-raising by references to alcoholic "beverages."

"I am driven to write to you in this vein after listening-in to a conversation between the studio and a big ship, in which laughter was provoked (?) to some 30 per cent. in the conversations to references to the bar and refreshments."

Dr. Ball does not want to be "narrow," but he asks: "Do you not think it time that there should be an end of such comedy made out of such tragedy, and that this form of free and far-reaching advertising should stop? Need humour be so cheap? Need our rising generations be led to believe that 'Come and have a drink' is *it*? Realising the power of your press, I appreciate your criticism and wish you success."

I have reproduced Dr. Ball's letter somewhat more fully than usual, because he represents the great bulk of middle-class listeners in this country. This body knows how to "play the game," but abhors vulgarity. The pity of it is that they do not allow themselves to be heard more often. Dr. Ball and others may take it that I shall continue to keep a vigilant ear on what comes over the ether.

They rang down the curtain on *Tosca* to the accompaniment of terrific applause, which the engineers faded out. *Tosca*, in my view, was one of the most popular successes of the season. There is a dramatic story, clearly intelligible, and music that is melodious and expressive.

I have heard this opera, as I had heard most of the others, very many times, but I never seem to tire of this.

Now we may look forward to the English opera season, which I am sure will be more widely appreciated by listeners. It is all very well for those who can *see*, as well as hear, opera. It does not matter so much

to them what the language is, but for millions of listeners language, after all, helps them to understand what is happening.

I was wondering whether Flotsam and Jetsam might compose a newer opening. They have so much new material that this rather stale overture gives a wrong impression. "Oh," you say, "here is that old thing again," and do not stop to listen, whereby, missing some bright topical hits.

They are always bright, although Mr. Flotsam's—or is it Mr. Jetsam's—vocal form varies.

There was a choice between this vaudeville programme and the symphony concert by the National Orchestra of Wales. As I was in a rather "stuffy" mood and wanted to say a word of praise of this fine orchestra, I started with the symphony concert. Alas, it was too mournful for words!

I wanted, too, to hear Harold Williams sing the beautiful Wagnerian aria, "Wotan's Farewell and Fire Music" from *The Valkyries*, so I waited. Beshrew me! Without apology or explanation, he sang a different song altogether—"Credo" from Verdi's *Othello*, in keeping with the rest of the dull programme. What reason had Harold Williams to change his programme in this fashion?



Maria Olszewska and Adrian Boult cartooned while rehearsing

NEWS

PLAY CRITICISM

So back to vaudeville, but, having heard "Old Yesterday," I tried the National Orchestra of Wales again. They played the "Andante with Variations," by Donanhyi. A terrible noise!

The B.B.C. news department tries hard; but, alas, it has got to be born in one!

To a world waiting for the news about the Hoover proposal, upon which the future of the world was dependent, we were given the red-hot news about Wimbledon! As I have said again and again, the news department lacks balance, and always has lacked balance.

I liked the topical talk by Mr. Kingsley Martin regarding publicity in murder trials, although the speaker was obviously unused to the microphone.

Mr. James Agate still goes strong, but if I may venture to offer him a piece of advice it is this: Do not try to say so much as you do. The consequence of your trying to pour out all that you wish to tell us is that you are inclined to hurry, and this is a bad fault for a popular broadcaster.

Dr. G. Dyson's final talk was headed "Debussy," but actually he told us more about Wagner. The Doctor is quite solid and interesting, even though he lacks the touch of his predecessor, Sir Walford Davies.

The opening dialogue of *Midsummer Madness*, written by Clifford Bax, sounded on such familiar lines that I did not continue to listen.

Funny thing, *Fedra*, which was relayed from Covent Garden, sounded better than it did when I saw it at Covent Garden. I listened in to the second production and found that this was the occasion when it paid to hear it free at home in the comfort of one's own hearth. The situations as one sees them on the stage look so ridiculous that the bright music is rather discounted.

Maurice D'Oisy is good in topical quick-time French songs, but his singing of "You Are My Heart's Delight" sounded somewhat tame after the great Richard.

The ROOM-TO-ROOM



Constructional details of an easily which, being contained in a portable carried from room to room or out i



almost in the centre is for the adjustment of the loud-speaker diaphragm, and once the best position for this has been found there is, of course, no need for further adjustment. Below is the main aerial tuning control.

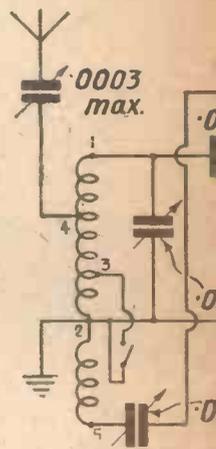
This is virtually the only knob which needs adjustment, for the reaction on the left is not critical and the wave-change knob on the right needs to be pushed or pulled only when the change is made over from medium to long-wave working or vice versa.

The cabinet of the "Room-to-Room 2" can be bought ready made, or it can be made up from stout plywood.

The best plan is to get the full-size blue-

print, which can be obtained, price 1s., post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. This gives the receiver unit in full size and also shows a dimensioned drawing of the cabinet. From this small drawing, which is also shown in the reproduction of the blueprint given herewith, you can get all the necessary particulars for the woodwork.

There is nothing very difficult about the construction of the box for the loud-speaker



DO you want a simple little set which you can take from room to room, working it on a short aerial and which, being self-contained, does away with all trailing aerial and loud-speaker wires? If so, then here is just the thing.

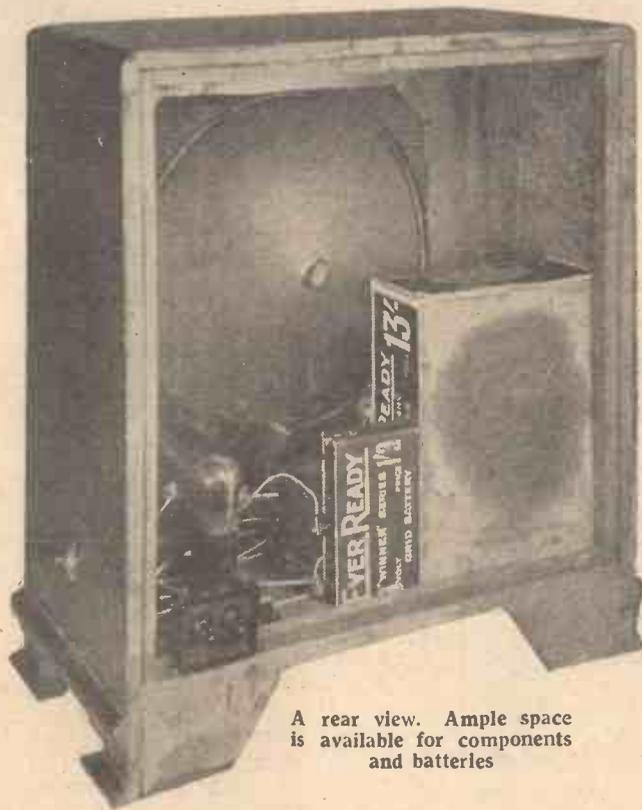
It is called the "Room-to-Room 2," and after inspecting the photographs and

blueprint and reading the detailed constructional description, you will have to agree that this title is apt.

The AMATEUR WIRELESS Technical Staff set about producing the "Room-to-Room 2" because it was felt that whereas in winter time one is content to have the set and loud-speaker in one room by the fire-side, now that the long, light evenings are here it is a great advantage to be able to have the speaker and, indeed, the whole set, in any room in the house and even, on occasions, in the garden.

Even if you already have a good permanent set, there is no reason why you should not make up the "Room-to-Room 2" as a useful standby for "transportable" reception. The actual cost of the parts in the set is very low and you could use the same batteries and valves as are in the main set, although, for the guidance of those who are making up the "Room-to-Room 2" as their one and only set, particulars of suitable valves and battery voltages will be given later.

A novel feature of the set, as you can see from the photographs, is that it is all contained in the loud-speaker cabinet. On the front of the set there are four small knobs. That



A rear view. Ample space is available for components and batteries

COMPONENTS FOR THE

- Cabinet, 16 in. by 16 in. (Osborn, type 176).
- Baseboard, 14 in. by 6½ in. (Osborn, Cameo, Clarion).
- .0005-mfd. variable condenser (Lotus, Telsen, Readl-Rad, J.B., Peto-Scott, Polar, Formo, Voltron).
- .0002-mfd. variable reaction condenser (Lotus, Lissen, Bulgin, Polar, Formo).
- Dual-range coil (Sovereign, Tunewell).
- Filament switch (Bulgin, S.80).
- Slow-motion dial (Astra Midget).
- Two valve holders (Wearite, Telsen, Lotus, Lissen, W.B., Benjamin, Clix, Junit).
- .0003 max. mid. pre-set condenser (Lissen, Telsen, Sovereign, Leweos, R.I., Formo, Polar).
- Two .0002-mfd. fixed condensers (Readl-Rad, Telsen, Lissen, Formo, Dubilier, T.C.C., Sovereign).
- 3-meg. grid leak and holder (Readl-Rad, Lissen, Dubilier, Graham-Farish).
- L.F. transformer (Telsen, "Radio-grand,"

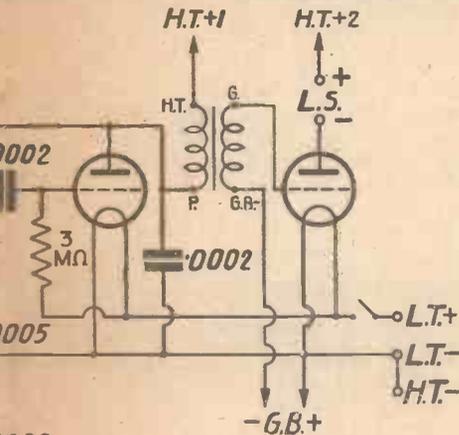
ROOM 2

-built two-valve receiver
e type of cabinet, can be
nto the garden as required

fret forms the front and the four sides
and feet can easily be assembled.

The receiver unit of the "Room-to-Room
2" is wired up in a very straightforward
manner with an efficient detector circuit
and an ordinary transformer-coupled power
valve. An arrangement of this kind
necessitates the very minimum of parts.

Examine the list of components and
prove this for yourself. By the use of the
cabinet as a support for the components of
the receiver unit the cost is also consider-
ably lowered. It is quite probable, in fact,
that there will be many amateurs owning
loud-speakers already housed in cabinets
providing sufficient room for the receiver
unit.



Circuit of the "Room-to-Room 2"

"ROOM-TO-ROOM 2"

- Lissen, Varley, Ferranti, Lewcos, Burton, R.I., Voltron).
- Terminals marked A. and E. (Belling-Lee, Clix, Eelex).
- Five plugs, marked : H.T.—, H.T.+1, H.T.+2, G.B.—, G.B.+ (Clix, Belling-Lee, Eelex).
- Two spades (Clix, Belling-Lee, Eelex).
- Terminal mount (Junit, Lissen, Sovereign).
- Two yards thin flex (Lewcoflex).
- Connecting wire (Lewcos).
- Sleeving (Lewcos).

ACCESSORIES

- Loud-speaker unit (Blue-Spot 66K).
- Cone and cone washer, chuck and extension rod (Weedon Adaptacone, 10 in.).
- 120-volt H.T. battery (Ever-Ready Winner, Drydex, Lissen, Pertrix).
- 9-volt G.B. battery (Ever-Ready, "Winner," Drydex, Lissen, Pertrix).
- 2-volt accumulator (Exide JZ3, Pertrix, C.A.V.).

The tuning coil, main condenser, and reaction condenser are mounted on the loud-speaker fret and the main on-off switch of the set is on the side of the loud-speaker cabinet. At the back of the cabinet is a small terminal strip carrying the aerial and earth terminals. The other part, comprising the two valve holders, low-frequency transformer, grid condenser, and leak and so on, stand on a loose wooden platform, which is cut away, as shown, to provide support for the baffles.

The best method of construction is to mount the reaction condenser, tuning condenser, and coil and to wire these up before the loose section, carrying the valve holders and transformer, is put into position.

The exact arrangement is not critical, but it is advisable to follow the blueprint scheme for the sake of neatness and to get all the leads as short as possible. No difficulty at all should be experienced in connecting up because the circuit is a very simple one and all the terminals on the big parts, such as the low-frequency transformer and tuning coil, are clearly marked.

Nevertheless do not run the risk of making a mistake in the wiring, which may be expensive if it means the burning out of a valve. Check over all the leads when the wiring has been done and then you will know that the set will work properly the first time it is switched on.

Naturally a great deal depends on the choice of valves. Some good 2-volt valves suitable in the detector position are Mullard PM2DX, Cossor 210Det, Marconi L210, Mazda L210, Osram L210, or Eta BY2010.

The power valve can be chosen from the following 2-volters : Cossor 215P, Mazda P220, Mullard PM2A, Eta BW303, Marconi or Osram LP2.

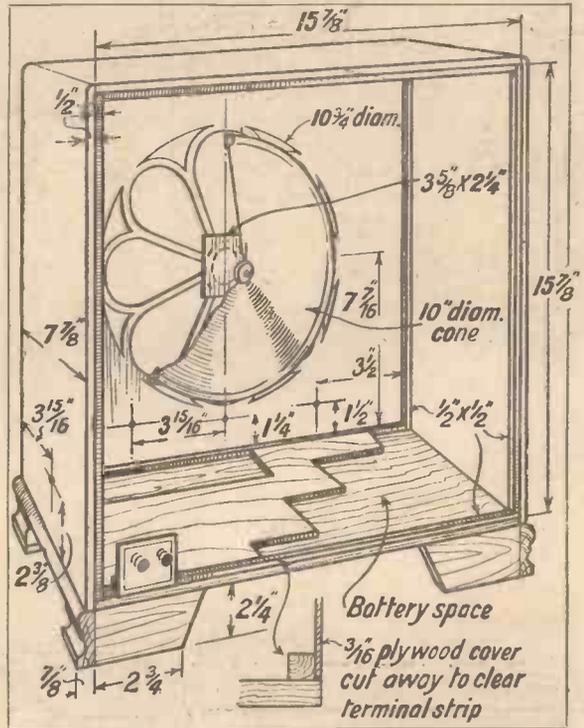
The recommended high-tension and grid-bias batteries are Ever Ready "Winner," Drydex, Lissen, or Pertrix, 120 volts and 9 volts respectively.

For good results from the local station nothing very elaborate in the way of an aerial or earth is necessary, but of

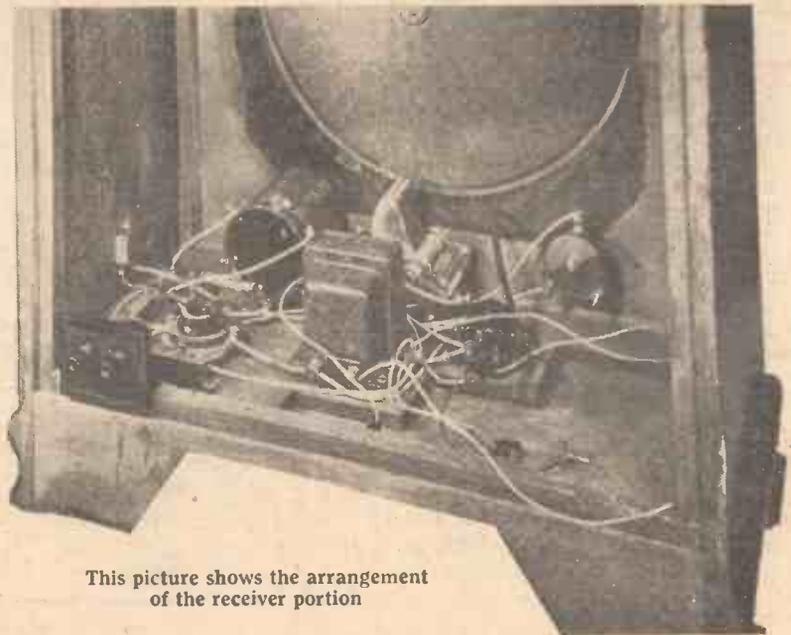
course with a set of this description there is no high-frequency amplification, efficiency in the aerial at least is desirable, if good foreign-station reception is needed.

Take care over the adjustment of the speaker, for otherwise you may lose volume here and the purity will not be good. The cone is clamped on the driving rod so that the open edge of the cone is pushed reasonably tightly against the back of the loud-speaker fret. The knob of the unit should then be adjusted so that the armature just clears the poles and is in its most sensitive position.

The H.T.+2 tapping should have the



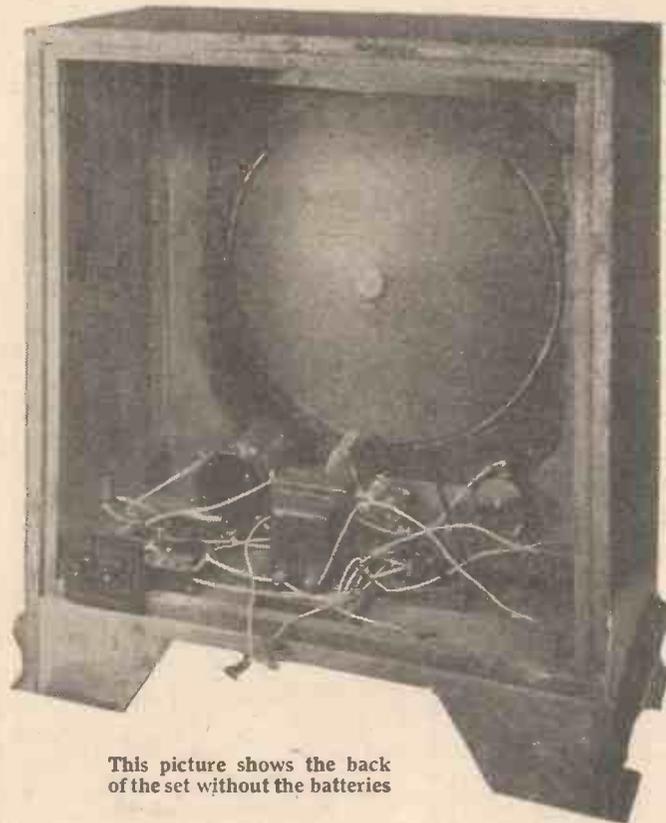
Details of cabinet and loud-speaker



This picture shows the arrangement of the receiver portion

“THE ‘ROOM-TO-ROOM 2’” (Continued from preceding page)

maximum high-tension voltage on it, while a slightly lower voltage should be applied to the H.T.+1 tapping. About 70 or 80 volts may be tried on this tapping, but the exact value is not critical.



This picture shows the back of the set without the batteries

See the “Room-to-Room 2” this week in the Radio Department of Messrs. Selfridge & Co., Ltd., Oxford Street, London, W.1.

WHAT ARE THE SOUND WAVES SAYING?
—WEBER

WE do not hear much of Weber these days, but I did chance to hear the overture to *Euryanthe* the other night. Carl Maria von Weber was the son of a musician who spent a good deal of time moving about from one place to another, as he happened to be director of a travelling troupe. Weber consequently did not receive a very sound education, but he learnt dramatic art in very early years; hence his subsequent operatic successes.

When Weber, at eighteen, was offered the directorship at the theatre in Breslau, there was something of a riot, several members refusing to work under one so young. Later, in Prague, something of the same sort happened. The orchestra was composed of Czechs who irritated Weber by commenting on everything he said in their own language, which he did not understand. However, he took lessons and one day surprised them by taking them to task both vehemently and fluently.

For some time he was secretary to the

King of Württemberg, a position that also included secretarial duties to the Duke, the King's brother. This Duke never had a penny to his name and was always going to his debts for the honour of the family. Weber's duties, so far as the Duke was concerned, were chiefly keeping creditors quiet.

Unfortunately, it was always Weber who was deputed to interview the King on behalf of the Duke. On one occasion, after enduring violent explosions from the irate monarch, Weber was practically hurled out of the room. In the corridor he met an old woman who inquired for the laundress. “She's in there,” said Weber, maliciously, pointing to the King's private room. “Go straight in.” The woman went “straight in,” and came out again very quickly. The Duke had to beg very hard for Weber that time.

Weber died in England of consumption in 1826. He had been over here producing *Oberon* which he wrote for the English stage. He needed money or,

at least, he wanted to put enough by for his wife, especially as his doctor had told him that his time was short. “You will not live more than five years,” he said. “And what if I go to England to write the opera?” asked Weber. “Six months at the most.” “All right, I go!”

WHITAKER-WILSON.

A B.B.C. THEATRE ORCHESTRA

THE formation of the B.B.C.'s new theatre orchestra of about twenty is now almost completed and this combination will be heard for the first time in the revue *The Stage Revolves*, on July 22 and 24.

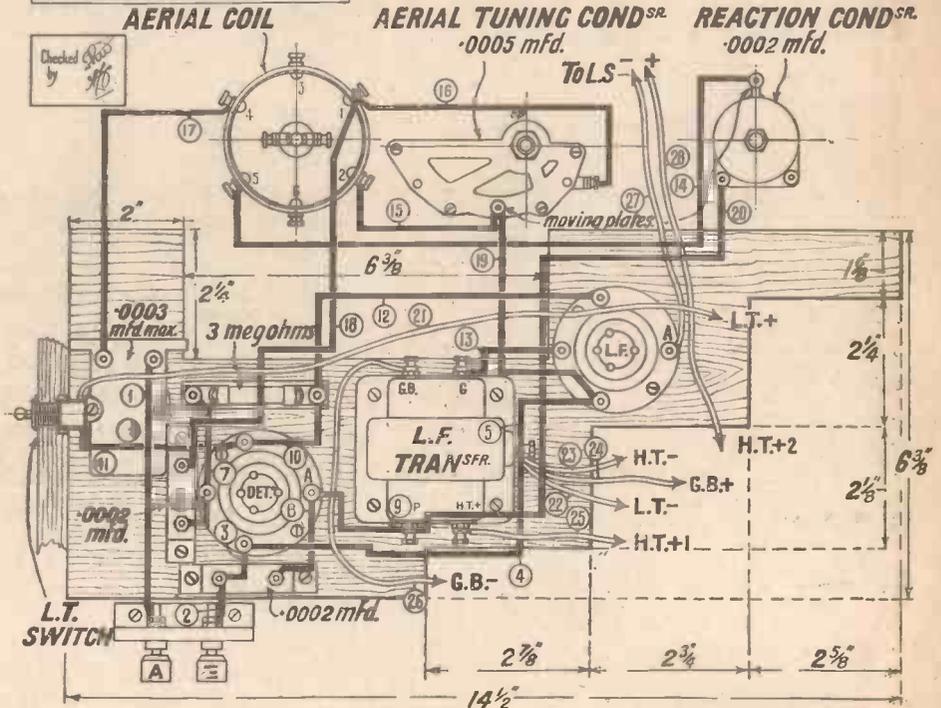
It will also give an hour's performance in the National programme on July 27, with Leslie Woodgate conducting. The Theatre Orchestra is to be heard on some Sunday evenings.

Listeners will have a good hour's entertainment if they tune in to Midland Regional on July 23, when *That Reminds Me...*, a reminiscence extravaganza, produced by Charles Brewer, is broadcast. The cast includes Donald Davies, supported by Evelyn Over, Harry Saxton, Peter Howard, Ernest Parsons and his Orchestra and the Midland Studio Chorus.

Gertrude Fuller, a pupil of Ysaye, is to appear in the Midland Regional programme for the first time on July 19. Miss Fuller studied with the famous violinist for three years in Brussels.

An important broadcast on the religious side takes place from Belfast on August 2, and is the first of several new religious broadcasts which have been arranged in the province of Ulster.

BLUEPRINT N° A.W. 298



The layout and wiring diagram of the actual receiver. A full-size blueprint is available, price 1/-

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2 J.B. .0005-mfd. junior log slow-motion condensers, 40-1 ratio ..	2 5 0
1 Set Lewcos super-het coils ..	1 1 0
1 Sovereign 50,000-ohm potentiometer ..	2 10 0
1 Readi-Rad 8 valve base ..	4 6
1 Telsen 4-pin valve holder ..	7 0
2 Ferranti C2C condensers ..	6 6
2 T.C.C. 1-mfd. fixed condensers ..	9 0
5 Telsen fixed condensers; 2, .001; 2, .002; and 1, .0002-mfd. ..	5 8
1 Readi-Rad 1-megohm grid leak ..	2 6
3 Readi-Rad Link resistances; 15,000, 20,000 and 30,000 ohms ..	10
1 R.I. Parafeed L.F. transformer ..	4 0
1 Readi-Rad 3-point switch ..	8 6
1 Readi-Rad fuse and holder ..	1 6
1 Readi-Rad 3-point terminal strip ..	1 3
6 Belling-Lee wander plugs; 4, H.T., and 2, G.B. ..	6
2 Spade terminals ..	1 0
1 100-yds. reel Lewcos 9/40 frame wire, L.Z. 2140 ..	3
1 50-yds. reel Lewcos 27/40 frame wire, L.Z. 2240 ..	4 3
1 Pkt. Readi-Rad "Jimlinx," wiring ..	5 6
1 Ormond portable loud-speaker unit and chassis ..	2 6
6 Mullard valves as specified: 2, S.G.; 2, H.F.; 1, L.F.; 1, Power ..	1 5 0
6 yds. flex, wire, screws, etc. ..	3 16 0
TOTAL (including Cabinet & Valves)	£14:1:0

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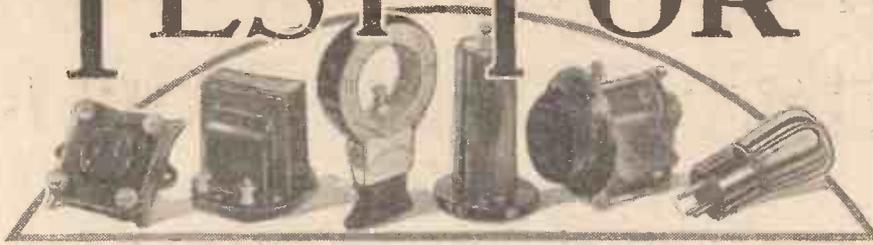
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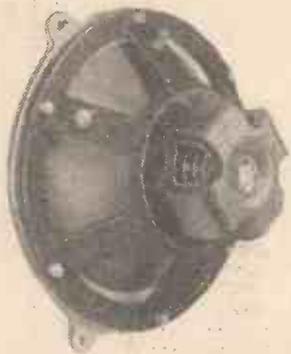
and tests of
apparatus.

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

Epoch Moving-coil Speaker

THE whole trend of moving-coil loud-speaker design is towards the production of smaller and more efficient units of the permanent magnet type. Some of the units at present on the market are exceptionally small and light, and are thus quite suitable for use in portable receivers. To this class belongs the Epoch Type A.1. permanent-magnet moving-coil loud-speaker.

The magnet used is of the now familiar cross type which gives a high flux density in the gap; the permanence of this magnet is guaranteed for two years. The moving



The Epoch
permanent-
magnet moving-
coil speaker

coil itself which is smaller than usual, being just under 1 inch in diameter, is mounted on a machine-made paper diaphragm, which in turn is suspended from a leather surround. The whole assembly is mounted on a rigid metal chassis arranged for screw or bolt fixing to the baffle board or cabinet in which it is to be mounted.

On test, the speaker gave pleasant results. The bass reproduction, however, was perhaps a little below normal, this being due in part to a small coil used and consequent stiffness of the centring device. The sensitivity was up to standard, good volume being obtained with a normal detector and one L.F. type of set. We found that, as was expected with so small a speaker, it could not handle an input from the amplifier in excess of approximately 1 watt. The total weight of this speaker is only five pounds; it thus can be recommended for use in all types of portable or transportable receivers. This speaker sells at £3. 3s.

Astra "Midget" Dial

THE new Astra "Midget" dial which we have received for test this week is an interesting component of foreign manufacture. As indicated by its name it is small, measuring only $2\frac{1}{4}$ inches by $2\frac{1}{2}$ inches overall. However, in spite of its smallness, it is well made, the reduction gearing which

has a ratio of approximately 11.1, being noticeably free from backlash. The dial casing is of bakelite and has the scale engraved on it in white. There are two operating knobs. The lower one works the slow-motion mechanism, while the upper one which carries the pointer is fixed to the main spindle and may thus be used for a direct drive. The slow motion is brought into use by pushing the bottom knob upwards, the positions being quite definite and positive.

The dial is fixed to the condenser spindle by means of a grub screw in the centre of the upper knob. One small hole, other than that required for the condenser spindle, is necessary for fixing. The dial, which can be obtained in either a black or brown finish, retails at 2s. 6d.

Lissen Valves

NOW that summer is again with us many readers are turning their thoughts to the subject of portable receivers to take with them on their holidays, and inevitably the question of H.T. supply and the output valve will arise. In previous years this question has been somewhat difficult of solution, but from all signs the difficulty should be very much less this year.

It was, therefore, with considerable interest that we tested the new Lissen Pentode PT225 valve, which has been produced with the idea of economy of H.T. consumption in mind. The valve is of the conventional four-pin type with vertical electrodes.

On test the valve satisfactorily fulfilled the purpose for which it was intended, namely to give moderate power to the loud-speaker when supplied with small input, at the same time consuming very little power from the H.T. supply. With 110 volts on the screen and 120 on the anode, the anode current was only 4 milliamps with a grid bias of $4\frac{1}{2}$ volts. Under these conditions the power output was approximately 220 milliwatts, which is well in excess of the capabilities of any three-electrode valve having a consumption of the same order.

When using this valve it is necessary to remember that it should only be fitted in the output stage of a set, and should immediately follow the detector valve, because a small grid swing of a few volts is sufficient

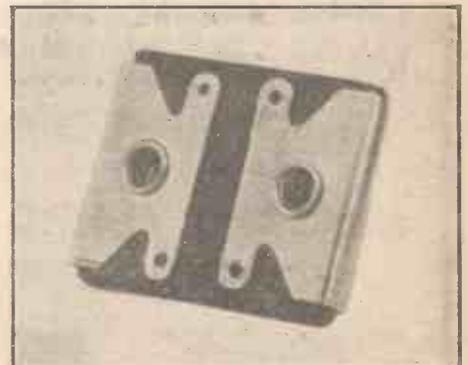
to load it up fully. The valve retails at 12s. 6d. and can be recommended to readers.

New Wates Fixed Condensers

THE new Wates small condensers are available in a range which includes capacities varying from .001 microfarad to .005 microfarad. The condensers are of the so-called flat or postage-stamp type, and consist of copper foil interleaved with mica sheets, the whole assembly being held together by metal end pieces, which, by means of eyelet holes, are also used for making connection to the condensers.

A range of grid-leak type resistances is also available, which includes values varying from 10,000 ohms to 5 megohms; all being rated to dissipate 2 watts continuously. The resistances are constructed from elements in insulated sleeves wound on to flat formers with metal end-pieces, the whole being "doped."

A range of special holders is also available to enable these condensers and resistances to be used together in any combination



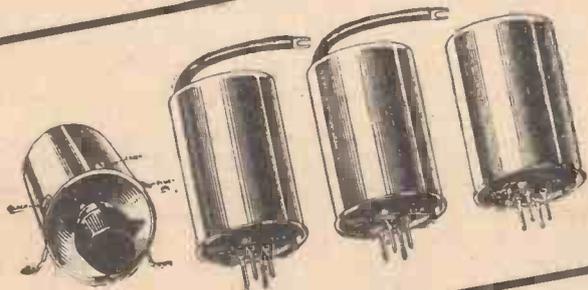
One of the wide range of Wates fixed
condensers

such as may be necessary for leaky-grid detector circuits, or for resistance-capacity coupled amplifiers.

The tests were conducted on a .001-microfarad condenser and a 5-megohm resistance. The measured capacity of the condenser was .00097 microfarad which is nearly in agreement with the rated value. The resistance was, however, below its rated value, being only 3.5 megohms. These components are cheap, the retail prices of the condensers up to the .0009-microfarad size being 5d. each, .001 and .002 microfarad, 6d. each; .003 and .005 microfarads, 8d. each. The retail price of all the resistances is 10d. each. Holders for mounting one condenser retail at 6d. each, for 1 condenser and one resistance, 9d. each, for one condenser and two resistances, 1s. 6d. each.

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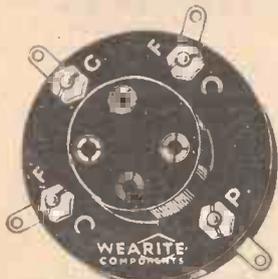
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HOW TO MAKE A SHORT-WAVE WAVEMETER

By J. H. REYNER, B.Sc., A.M.I.E.E.



The complete instrument

I DESCRIBED in an issue a week or two ago (AMATEUR WIRELESS, No. 473) how searching on the short waves could be considerably simplified if one possessed a wavemeter. Even though you have experimented with short waves before, you will find that a wavemeter is a valuable asset as it simplifies your searching very considerably. The meter about to be described is of very simple construction.

Making up a wavemeter from a published description is usually not a very practicable proposition because the calibration is apt to be altered by all sorts of variations outside one's control. With an absorption wavemeter which is the type we customarily employ for short-wave work, the possible sources of variation are minimised since the circuit consists purely of a coil and condenser. There are no other accessories such as coupling windings, buzzers, etc., which can introduce variations, and if it were possible to duplicate the coil exactly and to use a condenser having the same capacity, the tune of the circuit would be exactly the same.

An attempt has been made in the present instance to get as close as possible to the conditions which are capable of being duplicated in actual practice. The coil used is a standard 4-turn Igranite short-wave plug-in coil. These are wound on a special former and subsequently mounted in a framework which keeps the turns rigidly spaced the required distance apart. In consequence of this the inductance of any two coils having the same number of turns is very nearly the same. The condenser used is the Cyldon since I have found from long experience that these condensers are remarkably well matched. Therefore, if the reader uses the coil and condenser specified he will be able to assume that the calibration chart provided with this article is reasonably accurate.

Plug-in coils have been used so that the wavemeter may be used on other ranges by replacing the coil with another one. In the majority of cases, however, the 4-turn coil will be found to be satisfactory since this covers the principal stations normally received on the short-wave telephony band and the calibration chart accompanying this article is for a 4-turn coil. If the coil is changed, be careful to catch hold of it by the plug and not by the coil itself, as it is possible to bend the wire of these short-wave coils, in which case their calibration may vary slightly.

The condenser is mounted on a small panel which is provided with a slow-motion dial. Incidentally, this dial should be set so that it reads 180 when the plates are fully in. This is desirable to ensure that your wavemeter calibration shall be as near as possible

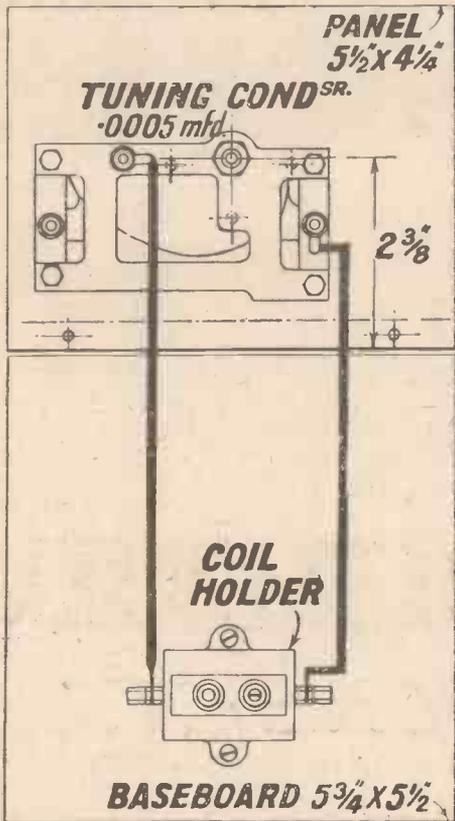
to that of the original. The coil is mounted on the baseboard close to the end of the condenser and the dimensions given on the diagram should be followed as accurately as possible, so that the wavemeter as made up shall be as far as possible a duplicate of the original. The leads between the condenser and coil are taken directly from the points shown. Squared wiring is not used, the object being to keep the leads short.

With these various precautions the calibration of the completed instrument should be within a degree or so of that shown on the chart provided. I checked up the calibration on several coils which I had by me and found that they all agreed to within one degree. At the same time, when the wavemeter has been in use for a little time so that you are used to its operation it is preferable to check up the calibration in the manner described in the previous article. For the sake of completeness the method of operation and calibration will be given again.

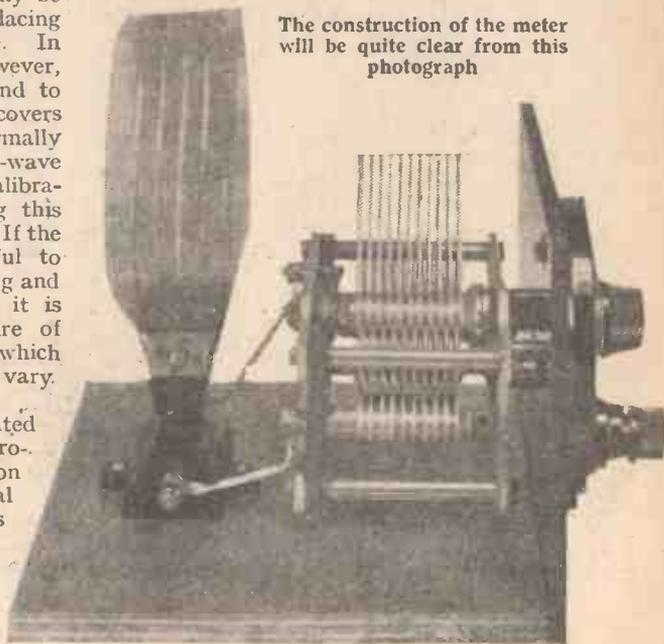
Operating Notes

The operation of the wavemeter consists in bringing it close to the circuit under test. A distance of two or three inches away is sufficient. The receiver will, of course, normally be tuned-in to a signal. The dial of the wavemeter is slowly rotated until at one particular point there will be a marked reduction in the signal strength. Indeed, the signals may be tuned out completely. By referring to the wavemeter calibration for the particular setting at which this

(Concluded on page 90)



The layout of the wavemeter with connections



The construction of the meter will be quite clear from this photograph

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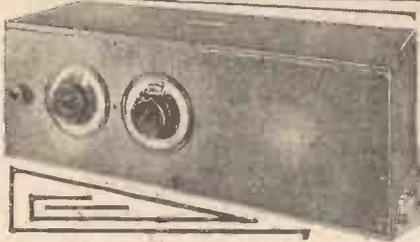
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Makers: GENERAL ELECTRIC CO., LTD.

Price: £27 10s.

FROM the G.E.C. I recently received a very unusual set—namely a six-valve super-het specially designed for use overseas and tuning from 13 metres up to 720 metres. This tuning range enables the overseas listener to receive his home stations on the medium waveband and to tune in the Chelmsford short-wave station on 25 metres, as well as hosts of other short-wavers.

The circuit consists of the supersonic heterodyne principle interpreted as a six-valver. Three valves are Osram S215's, two are Osram H210's and the remaining valve is an Osram P2. The aerial is coupled to a stage of high-frequency amplification through a high-frequency transformer. The tuning condenser for this amplifying stage is ganged to the aerial tuning condenser. A separate trimmer is provided, especially useful on the short-wave range.

Circuit Arrangements

Then comes the separate oscillator valve, tuned by a separate condenser. An interesting point is that the functions of first detector and first intermediate long-wave amplifier are combined. The intermediate amplifier, consisting of two stages, employs band-pass filters, thus providing combined selectivity and good quality reproduction.

The second detector follows the intermediate amplifying stages, and is transformer-coupled to the power output valve. A choko filter is included in the loud-speaker circuit.

A point of convenience is that the anodes of the valves are fed from a common high-tension supply. The screen grids of the high-frequency amplifying valves are generously decoupled, as are other parts of the circuit. In fact, this set is notable for the circuit refinements included to ensure good quality of reproduction, thus giving the lie to the theory that super-hets cannot give good quality!

The appearance of this remarkable set can be seen from the photograph. The cabinet and screens are made of strong brass sheet. The whole construction has been designed to withstand the extreme climatic conditions prevailing in the different parts of the world in which the set is likely to be installed.

In order to cover the uncommon wavelength range of 13 to 720 metres, this Gecophone super-het is supplied complete with a special container with six sets of plug-in coils, three coil changes being needed to go from one wavelength range to another. Four of these coil sets together cover the 13- to 100-metre range and the remaining two sets cover all wavelengths between 198 and 720 metres.

These coils are provided with a long

central and a short offset pin in the base, with contact pins round the periphery. The centre and offset pins are arranged to engage two holes in the coil holders in such a way that it is impossible to insert the coils wrongly. After changing coils for a few times, one learns to appreciate the fool-proof nature of the coil holders.

On the front of the metal cabinet are the controls. The two main controls take the form of large slow-motion dials, marked in degrees from 0 to 100. The right-hand dial is critical in its setting, because it controls the tuning condenser of the oscillator circuit. The left-hand control is not nearly so critical, operating as it does the two-gang condenser connected to the aerial and high-frequency-amplifying circuits. On the extreme left is the trimmer tuning control.

On the left-hand side of the cabinet is a knob controlling a potentiometer, which provides a very good variation in sensitivity, enabling the strong medium-wave stations to be reduced to normal requirements.

On the right-hand side of the cabinet is a very neat arrangement of terminals for the battery connections and loud-speaker. A stout connecting cord obviates the need for separate leads to the batteries.

As this is a battery-operated set the question of anode-current consumption is important. With a maximum voltage of 120, I found the anode current when the set was in action was 19 milliamperes. The makers quite frankly state that triple-capacity batteries are needed for working this set. If the mains power is available there are suitable A.C. and D.C. units for the elimination of the high-tension battery.

Remarkable Results

I have spent a most interesting week putting this short-waver through its paces. During that time I have been able to log an enormous number of European and trans-Atlantic broadcasts, especially between 20 and 45 metres.

Such American stations as 2XAF on 31 metres, 2XAD on 19 metres, and 8XK on 25 metres have come in at tremendous loud-speaker strength, in spite of the fact that they are all more than 3,000 miles away. Such is the spanning power of the short waves!

It has been interesting to tune in some of the European short-wave relays at times when the medium-wave foreign stations have been inaudible. For example, Zeesen and Rome on 31 and 25 metres respectively have been brought in during the early evening when the medium-wave German and Italian stations have been quite inaudible. I must emphasise the fact that

quality of reproduction on this Gecophone super-het is first-rate, even when receiving stations thousands of miles away.

On the medium waves between 200 and 500 metres the performance, while very creditable, is not up to that on the ultra short waves. Nevertheless, a large number of stations can be received with the greatest ease of operation, and at a strength that requires considerable use of the volume control.

Not the least attractive asset is the provision of calibration curves for each set of coils. These enable the operator to locate a station within a few seconds of inserting the appropriate set of coils. Altogether the set is a great achievement!

SET TESTER.

THE OXFORD FESTIVAL

TWO Queen's Hall concerts given by the B.B.C. take place on July 27 and 28 in connection with the Oxford Festival of the International Society of Contemporary Music. The first will be heard by Regional listeners and the second by National listeners. Earlier in the festival, on July 23, a concert will be given from a studio of some of the music given earlier in the day at Oxford, and for this purpose the performers will be brought to Savoy Hill.

A band concert will be given from the Cardiff studio for West Regional listeners on July 19. The Cory Workmen's Silver Band will play.

A choral concert by the Newport Choral Society will be relayed from the Central Hall, Newport, in the West Regional programme on July 23.

A West Country variety programme will be given on July 24 in the West Regional programme.

"The Wisdom of Henry Irving" is the subject of the second talk in Mr. Froom Tyler's series, "Wise Men of the West." This talk will be given on July 25 from the Bristol Studio.

A Welsh programme will be given from Cardiff studio for West Regional listeners on July 21. The National Orchestra of Wales, conducted by Warwick Braithwaite, will play items by Welsh composers.

The Overseas "Century Super" Kit.—In connection with "Set Tester's" description of the Overseas "Century Super" kit described last week on page 58, it should be noted that this kit is sold with J.B. tuning condensers.

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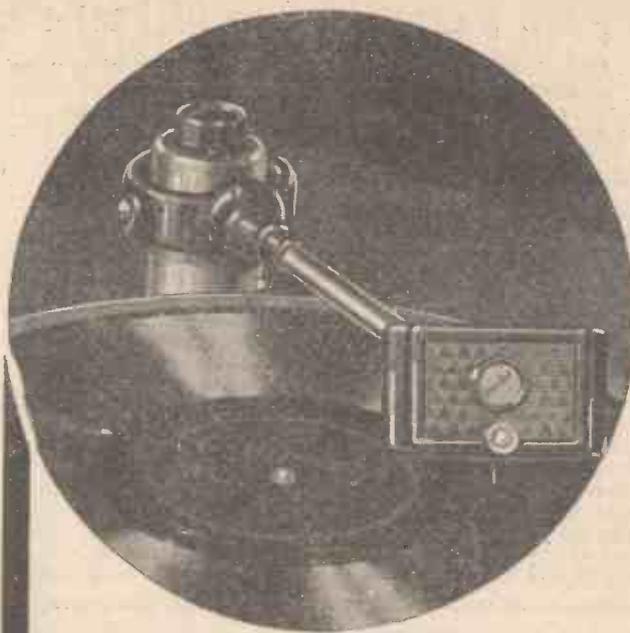
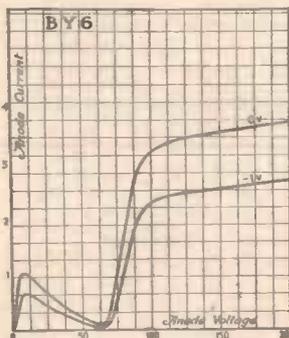
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OUR LISTENING POST—By JAY COOTE

RADIO NORMANDIE (Fécamp) as an habitual straggler should be awarded first prize. Operating for many months on 222.9 metres, a move was recently made to 219 metres, then later to 252 metres, and for the past week or so the station has been wobbling up and down that section of the waveband. When last heard of it had settled down on 235.8 metres, but this may not prove a prolonged stay. At the same time, it seems that Fécamp is working with two transmitters, namely, with an additional one of higher power than its original plant and that a more favourable position is being sought for it.

Palermo since its advent on the ether has not proved quite so unsteady, although it also has made two changes. To-day you will find this newcomer on about 540 metres, between Munich and Sundsvall. For the present it is clear of both. Whether Genoa will alter its wavelength is a moot point; tests have been made around 524 metres, but on recent evenings I have found no Italian station in the neighbourhood of Riga's allotment.

Once again the Dutch studios have carried

out their quarterly move, and the Hilversum studio broadcasts are back on 1,875 metres, Huizen having to be contented with the lesser favourable 299-metre channel. Personally, I always welcome Hilversum's presence on the upper band, where the transmissions are better heard with less interference. Besides, to my mind, the A.V.R.O. and V.A.R.A. programmes prove of greater interest than do those of the competing station.

In July and August, during the period of the Salzburg Music Festival, you should not fail to turn to Vienna for some outstanding events. On July 25 the Stagione d'Opera Italiana, composed of artistes, chorus, and orchestra from the Scala Theatre, Milan, will visit the Austrian capital for a series of performances to be broadcast through the transmitters. Possibly, Mozart's *Barber of Seville* (July 25), Cimarosa's *Secret Marriage* (July 30), *The Marriage of Figaro* (August 5), and *The Magic Flute* (August 25) will also be relayed to foreign stations. The summer months promise a series of noteworthy transmissions from stations well received in the United Kingdom.

A NEW SPEAKER UNIT

A LOUD-SPEAKER unit incorporating several novel features, costing only 7s. 6d., and guaranteed for twelve months, has just been produced by J. & H. Walter, Ltd., of 15a Maxwell Road, S.W.6. A novel method of construction—there is not a screw or bolt in the whole assembly—has enabled the price to be brought down to this low level, although the tone is really good and the volume ample. Full details can be obtained on request.

Atlas Pentode Choke.—In the test report of the Clarke's Atlas pentode choke given on page 54 of AMATEUR WIRELESS, No. 474, the price of the unshrouded model was given as 15s. 6d., whereas the correct price is 17s. 6d. The shrouded model sells at 21s., as stated.

"HOW TO MAKE A SHORT-WAVE WAVEMETER"

(Continued from page 86)

absorption takes place the wavelength of the station being received can be read off.

Absorption

The closer the wavemeter is to the tuned circuit, the more marked is the absorption, but the broader is the region over which the effect takes place. For accurate results, therefore, the wavemeter should be gradually moved a little farther away, once the absorption point has been found, until the effect is only noticed over a degree or so on the dial.

Where the circuit is not tuned in to a station, allow the circuit to oscillate gently. The reaction should be just sufficient to start the circuit oscillating. On bringing the wavemeter close to the circuit and tuning it in, the oscillations will be found to cease with a sharp click at one point on the wavemeter and to start again with another click a few degrees farther on. Draw the wavemeter farther and farther away until these clicks get very close together; in fact, until the circuit stops and starts oscillating at practically the same point on the wavemeter dial. This is the correct tuning point of the circuit and the wavelength may be read off on the calibration.

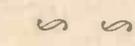
Remember that the wavelength of a circuit is usually altered slightly by the setting of the reaction condenser. Thus, when the circuit is caused to stop oscillating for the reception of an actual signal, the wavelength may be slightly different although the condenser setting has remained unchanged. The alteration in the reaction setting is sufficient to make a slight difference. This is another reason why the reaction condenser should only be just sufficient to make the circuit oscillate when doing a test of this nature. Then the change from the oscillating to the non-oscillating condition subsequently does not invalidate the whole result.

A combination of the two methods is often useful when one is tuned in to a station

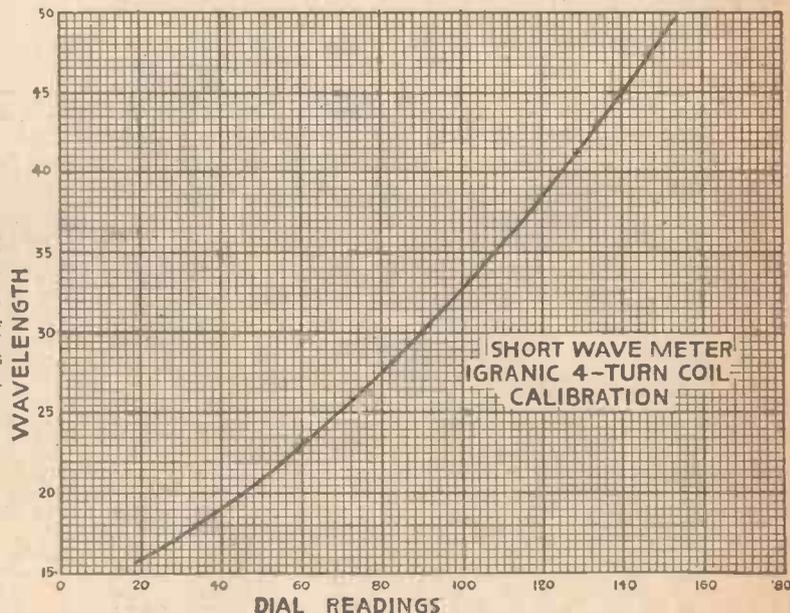
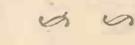
but one finds it a little difficult to get the exact absorption effect first described, owing, perhaps, to fading or some similar effect.

In this case it is advisable to allow the circuit just to oscillate. When the wavemeter is brought into tune the oscillation will cease and the signal itself will be heard

wavemeter should be noticed for these stations and the wavelength from the calibration chart should be compared with the actual figure known to be correct for the station in question. If the discrepancy is noticeable place a mark on the chart corresponding to the dial-setting on the wavemeter and the true wavelength. By



By constructing a chart on similar lines to this the calibration of the wavemeter is a simple matter



without any whistle. There are, indeed, numerous ways in which the absorption effect may be brought into play, some suited to one set of conditions and others to different circumstances. The general methods described, however, will suffice for normal purposes, and the instrument will be found to be of considerable use, firstly, in locating one's position on a new set; and afterwards, in identifying stations which have already been picked up.

In due course certain stations will definitely be identified by giving their call sign. Reference to the latest information published regarding the short-wave stations will then show the exact wavelength of these transmissions. The setting of the

doing this for a number of stations, a calibration of the wavemeter can be made. As many definite points of this nature as possible should be obtained, and then a smooth curve should be placed through all the points.

This curve will be similar in general character to that of the original published curve, the only difference being that it will lie slightly above or slightly below the actual one. It may conceivably cross the original curve, but this is not so likely. The variation between the actual calibration and the curve published herewith will not be more than a degree or so if the wavemeter is constructed as carefully as possible in accordance with the details given.

Postcard Radio Literature

A Power Amplifier

LEARN that Philips are producing a new speech amplifier working direct from the mains. This is fine for gramo-radio enthusiasts. Get particulars and see for yourself. **303**

Grosvenor Battery Prices

It is good news that reductions have been made in the prices of Grosvenor batteries and to hand is a leaflet setting out in full details of the high-tension, grid-bias, and general-purpose Grosvenor cells available, together with the new prices and type numbers. **304**

Ferranti Transformers

Several alterations are being made in the Ferranti transformer range. All-mains transformers, for example, are now being provided with a tapped input terminal block. The popular type A.F.5 push-pull L.F. transformer can now be obtained with two grid-bias terminals, enabling separate bias to be applied to each valve in the push-pull stage. Several new output transformers have also been introduced, both for ordinary sets and those incorporating a push-pull stage. If you are making up a new set or altering the old one, then you should write for a copy of the leaflet describing these transformers. **305**

"Motor" Speakers

Tekade Motor loud-speaker units are fully described in a folder which I have just received. The type S.4 and S.5 units are available separately or fitted, complete in cabinets. **306**

Describing "Talisman" Coils

There are probably a number of set builders who have not yet tried the "Talisman" coil. "Talisman" sets which have been described in AMATEUR WIRELESS using this special coil, have been very popular and those troubled with lack of selectivity or with poor tuning, should write to Wearite for a copy of a folder which gives a great deal of information on this new coil. **307**

Triotron Speakers

From Triotron comes a useful folder illustrating and describing the whole range of Triotron speakers. Separate units, chassis and complete speakers are to be had and you should keep this folder on hand for reference. **308**

OBSERVER.

GET THESE CATALOGUES FREE.

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

CLEAR TONE, free from 'background'

Reception with the Exide High Tension Battery is always crystal clear. No other source of power is so completely free from causing a background of buzzes and crackles. It is an essential part of the principle of this battery that it gives current without the slightest fluctuation or fall right to the end of its charge. This means also that it causes **no howl, harshness or "motor boating."** Distant stations come in clear. Helps selectivity too. **And economy.** The Exide High Tension Battery can be recharged. Used with a trickle charger it needs no more attention than a mains unit yet retains all its inherent advantages of clearer tone. That is why this battery is used in the **big speech amplifiers, talking film apparatus and everywhere that clarity of tone is of the utmost importance.**

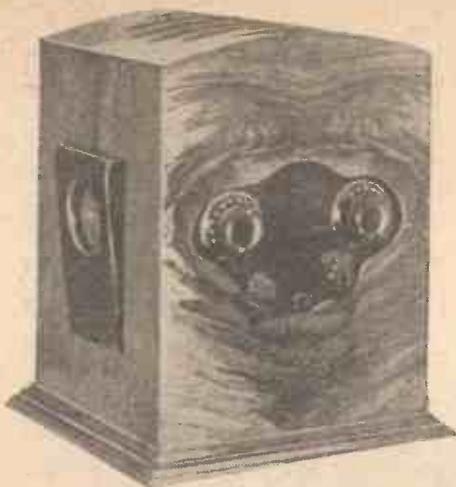


Prices: WJ, 60 volts, 2,500 milliamp hrs., £1.17s.6d. WH, 60 volts, 5,000 milliamp hrs., £2.6s 6d. WT, 30 volts, 10,000 milliamp hrs., £2.4s.0d. From Exide Service Stations or any reputable dealer. Exide Service Stations give service on every make of battery

Exide H.T. BATTERIES

Exide Batteries, Clifton Junction, near Manchester.
Branches: London, Manchester, Birmingham, Bristol, Glasgow, Belfast, Dublin.

N11



FURTHER NOTES on THE PORTABLE "CENTURY SUPER"

*Helpful advice on getting the very best
from your portable "Century Super"*

THAT all-Europe reception is possible with the portable edition of the "Century Super" is proved by the account on page 71 of a linguist's experience with his "Century." He was able to tour Europe at the mere turn of the two control knobs, and, having a knowledge of many of the languages, he was able to testify to the excellent purity even when the set was working at "full throttle."

To get the same results with your portable "Century" you must take care of several factors.

Valves are most important. Good valves make all the difference between fine results, with good purity and range and plenty of volume in hand, and disappointing reproduction.

In last week's issue on page 48 a full list

of recommended valves was given, and this advice should be closely followed. For instance, do not use the same valves in the first and second detector positions; valves with different characteristics are needed. For the first detector stage the following valves are suitable: Mullard PM1HF, Cossor 210HF, Mazda H210, Marconi H210, Osram H210, or Eta BY2023, while for the second-detector stage valves such as Cossor 210HF, Marconi HL210, Osram HL210, Mazda L210, Mullard PM1HF, or Eta BY2023 are suitable.

A valve such as the Mazda L210, Osram L210, Marconi L210, Cossor 210LF, Eta BY2010, or Mullard PM1LF is suitable for the oscillator position. To get the best results here it is not wise to experiment either with valve or battery values.

For the power stage any good power valve may be used. It must, of course, be biased properly and usually -9 volts is satisfactory.

The first detector and oscillator are biased through G.B.—1 and 1.5 or 3 volts will be suitable, usually -1.5 volts being the better value. The high tension to the first valve should be adjusted to suit the bias of the valve used. A usual value is about 70 volts. This is applied at H.T.+1.

All other high tensions are connected to the full voltage available.

"Tune slowly" is a good slogan to adopt when tuning the portable "Century." The set is tuned exactly as the "Century Super."

Put the oscillator switch to the medium-wavelength position and set the frame to the medium waves as well. Then switch the set on and with the volume-control potentiometer turned well over to the right or full-on position, the two condensers may be operated.

First put the oscillator tuning condenser at, say, 90 degrees, and then adjust the frame tuning condenser until a slight noise is heard, showing that the two circuits are now in tune.

The portability of this new "Century" is, of course, an immense advantage. The fact that the set can be carried from room to room without disconnecting any aerial, earth or loud-speaker wires makes it doubly useful. The only point to watch is that the set must not be stood too close to electric mains apparatus or to large metal surfaces. Hum might be picked up from the mains, and the presence of a large metal area in the neighbourhood of the aerial might cause a drop in signal strength.

COMPONENTS FOR THE PORTABLE "CENTURY SUPER"

Special cabinet (Peto-Scott, Readi-Rad, Camco).

Ebonite panel, 12 in. by 8 in. (Becol, Peto-Scott, Wearite, Readi-Rad, Goltone).

Baseboard, 12 in. by 9 in. (Clarion, Camco, Peto-Scott, Readi-Rad).

Two .0005 variable condensers (J.B. special 40 to 1, Readi-Rad, Telsen, Cyldon, Formo, Peto-Scott, Utility, Ormond, Polar).

Coils (Lewcos or Wearite).
50,000-ohm variable resistance (Watmel, Colvern, Regentstat, Sovereign).

Eight-valve holder base (Wearite or Lewcos).

One valve holder (Telsen, Lissen, Benjamin, Clix, Wearite, Lotus, W.B.).

Two 2-mfd. centre-tapped condensers (Ferranti C2C).

Two 1-mfd. condensers (T.C.C., Lissen, Dubilier, Telsen, Formo).

Five condensers: 1 .0002, 2 .002, 2 .001 (Telsen, T.C.C., Dubilier, Lissen, Formo).

One-meg. grid leak (Lissen, Telsen, Dubilier, Graham-Farish).

Three spaghetti resistances, 15,000, 20,000, 30,000 (Readi-Rad, Telsen, Tunewell, Sovereign, Lissen, Graham-Farish, Lewcos).

L.F. transformer (R.I. Parafed, Telsen, Lissen, Varley, Lewcos, Ferranti, Burton, Voltron).

Three-point switch (Readi-Rad, Goltone, Lissen, Benjamin, Bulgin, Telsen, Junit, W.B., Wearite).

Fuse holder and fuse (Readi-Rad, Telsen, Bulgin).

Terminal strip with three terminals (Peto-Scott, Readi-Rad, Wearite).

Six wander-plugs, marked: H.T.—, H.T.+1, H.T.+2, H.T.+3, G.B.—, G.B.— (Clix, Belling-Lee, Ealex).

Two spades, marked: L.T.—, L.T.— (Clix, Belling-Lee, Ealex).

Frame-aerial wire (Lewcos, Goltone).

Six yards of flex (Lewcos).

Connecting wire (Lewcos, Goltone).

Sleeving (Lewcos, Wearite, Goltone).

ACCESSORIES

Accumulator (Exide W.P.C3 [free acid]; JWJ7 [jelly acid]; C.A.V., Pertrix).

One grid-bias battery, 9 volts (Pertrix, Ever-Ready, Drydex, Lissen, Fuller).

120-volt H.T. battery (Pertrix, Ever-Ready, Lissen, Drydex, Fuller).

Loud-speaker assembly (Ormond).

Westinghouse Metal Rectifiers

: : are reduced in price : :

the H.T.5 from 15/- to 12/6 . . . the H.T.6 from 17/6 to 15/- . . . the H.T.7 from 21/- to 17/6

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The Westinghouse Brake & Saxby Signal Company Limited,
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Decoupling

SIR,—On several occasions I have seen it stated by Mr. James, under "In My Wireless Den," that sets capable of reproducing the very high notes in the audio-frequency range often cause interference in the form of whistles, which are strong enough to mar reception. I have been building sets and experimenting for some years and have never encountered such a form of interference, although I deliberately endeavour to retain the higher harmonies by using low values of grid leak and condenser and employing audio-frequency couplings with a rising characteristic from about 3,000 to 8,000 cycles. All stages are decoupled, however, and I think that therein lies the secret of "whistle elimination." I have proved that when using high-class components, especially transformers, such as Ferranti's, the decoupling of the detector is not sufficient and that decoupling resistances of less than 20,000 ohms and condensers less than 2 microfarad are practically useless.

I do not think sufficient attention is paid to decoupling and in my opinion no set should be designed without each stage being adequately decoupled.

M. E. C. (Ipswich).

Adding Pick-up to "Century Super"

SIR,—Having built the "Century Super," I wish to add the necessary wiring for a pick-up. Can you advise me in the matter of the wiring alterations necessary?

J. M. (Camberley).

The information you request has already been published, but, owing to an error, one wiring connection was omitted. We give the reply once more with the additional wire which was originally omitted. Mr. James does not recommend the use of a pick-up with the "Century Super," but here is the point-to-point wiring alterations to enable you to carry out the proposed modification. Disconnect wire No. 26 in the wiring plan and then add a two-pole change-over switch to the panel. You will also need to arrange a 50,000-ohm potentiometer on the panel to act as a volume control for gramophone. Connect the grid terminal of the second detector to the lower centre arm of the switch and take the upper centre arm of the switch to the L.T. switch wire No. 43. Take the right-hand lower terminal of the switch to the grid-leak-wire No. 27, and take the left-hand lower switch terminal to the centre terminal of the volume control. The two outer terminals of the volume control should be connected to the two terminals of the pick-up. Now disconnect wire No. 43 from the oscillator-valve holder and connect the wire to the terminal of second detector to which is connected wire No. 20. Disconnect wire No. 19 altogether and connect a further wire from the upper right-hand terminal of the switch to the terminal of the oscillator-valve holder to which wire No. 43 was originally connected. Finally, connect a length of flexible wire to one of the terminals of the volume control for the pick-up—either terminal may be used—and take the other end of the flexible wire to a point of about 1½ volts negative in the grid-bias battery. With the switch-arm over to the right, the set is switched for radio. With the switch-arm over to the left the set is switched for gramophone, and the valves not in use are switched off.—Ed.

The "Century Super"

SIR,—I have constructed the "Century Super" receiver and have so far received about four stations. Even these few stations, which include the two local, do not come in with any power. I have obtained fresh batteries of the power type, and this only gives me slightly more volume from the stations previously received. The valves used are as specified by Mr. James and the special coils have been back to the makers for test. Can you advise me in any way so that I may improve my results?

R. H. (London, S.E.).

If you have not adjusted your anode and grid-bias voltages according to the operating notes published you will not get satisfactory results. You are advised to obtain a milliammeter and connect it in the plate circuits of the various valves. The anode and grid-bias voltages should then be adjusted so that the current readings for each valve are as follows: First detector, 1 or 2 milliampere; local oscillator, about 3 milliamperes; anode of each S.G. valve, 1½ to 2 milliamperes; screening grid of each S.G. valve, ½ milliampere; second detector, 3 to 4 milliamperes; power valve about 6 milliamperes for the Mullard valve recommended or more for the particular type and make of power valve used.—Ed.

Tram Interference

SIR,—I wish I could give a little extra kick to Thermion's remarks on interference caused by trams. I live on the main road, on a slight hill, and the trams passing (overhead power wire) make loud noises on my "Century Super." I have tried shielding the S.G. valves, but to no avail. The B.B.C. tells me I cannot rid myself of this curse.

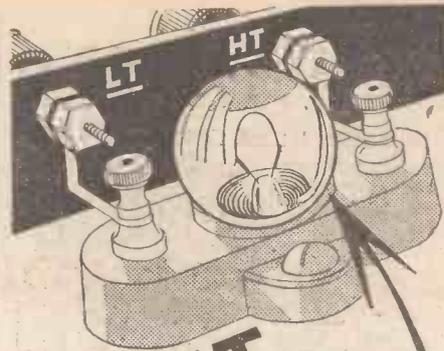
J. T. B. (London, N.).

"From Batteries to Mains"

SIR,—In a recent number of your journal a contributor explained how simple it was to alter a battery-operated receiver to an A.C. mains-operated receiver. As I have just had the mains installed at my premises and have a three-valve receiver which I wish to convert, would you mind explaining exactly what modifications in wiring are necessary? Details of the additional components would certainly be welcomed.

L. K. (Croydon).

The alterations necessary to make the change from batteries to mains operation in any receiver are simple to one who knows how or who understands the principles involved. The work involved to mark the wiring alterations on your blueprint wiring plan and also to determine what actual components would be best, what values of voltage limiting resistances would be required, and the arrangement of suitable resistances for free or automatic bias, is considerably involved. On no account could we undertake to make such drastic changes in the design of a receiver. Theoretical considerations do not always work out satisfactorily in practice, and such a change would most certainly entail practical experimenting. The best course for you to adopt would be to follow a practical design which has already been experimented with and published. The A.C. "Ether Searcher" or the "Everybody's All-electric Three" are designs which would meet your needs.—Ed.



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and rest assured that your valves are safe in the event of an accidental short circuit. Can be supplied in following ranges:

0.06 amps.	(50 milliamps)
0.15 "	(100 "
0.2 "	(150 "
0.3 "	(200 "

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BROADCAST TELEPHONY

Broadcasting Stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is aerial energy.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN											
25.53	11,751	Chelmsford	16.0	310	950	Marseilles (PTT)	1.5	416	721	Radio Maroc (Rabat)	10.0
242	1,238	Belfast	1.2	328.2	914	Grenoble (PTT)	3.0	1,250	240	Tunis Kasbah	0.0
261.3	1,148	London Nat. (G5SW)	08.0	369.3	911	Poste Parisien	1.2	NORWAY			
288.5	1,040	Newcastle	1.2	345.2	869	Strasbourg (PTT)	15.0	235.5	1,274	Kristianssand	0.025
288.5	1,040	Swansea	0.18	367.2	817	Radio LL (Paris)	0.5	240.6	1,247	Stavanger	0.625
288.5	1,040	Plymouth	0.18	385	779	Radio Toulouse	8.0	364	824	Trondelag	1.35
288.5	1,040	Edinburgh	0.4	447.1	671	Paris (PTT)	2.0	368.1	815	Frederiksstad	0.7
288.5	1,040	Dundee	0.18	466	644	Lyons (PTT)	2.3	453.2	662	Porsgrund	0.8
288.5	1,040	Bournemouth	1.2	1,445.7	207.5	Eiffel Tower	15.0	493.4	608	Bergen	1.35
288.5	1,040	Aberdeen	1.2	1,725	174	Radio Paris	17.0	692.3	506.5	Hamar	0.8
301.5	995	North National	70.0	1,725	174	"	85.0	1,085	276.5	Oslo	75.0
309.9	968	Cardiff	1.2	(testing shortly)							
356.3	842	London Reg.	70.0	GERMANY							
376.4	797	Glasgow	1.2	31.38	9,560	Zeesen	15.0	POLAND			
398.9	752	Midland Reg.	38.0	217	1,382	Königsberg	1.7	214.2	1,400	Warsaw (2)	1.9
479.2	626	North Regional	70.0	218	1,373	Flensburg	0.6	234	1,283	Lodz	2.2
1,554.4	193	Davenport (Nat.)	35.0	227	1,319	Cologne	1.7	244.1	1,229	Wilno (tests)	22.0
*testing on 479.2 m. (626k.)											
AUSTRIA											
218	1,373	Salzburg	0.6	227	1,319	Münster	0.6	314.2	954.8	Cracow	1.5
246	1,220	Linz	0.6	227	1,319	Aachen	0.3	335	896	Poznan	1.9
283	1,058	Innsbruck	0.6	232.2	1,292	Kiel	0.31	381	788	Lvov	21.0
352	851	Graz	9.5	239	1,256	Nürnberg	2.3	408	734	Katowice	16.0
453.2	666	Klagenfurt	0.6	246.4	1,217.2	Cassel	0.3	1,411.8	212.5	Warsaw	158.0
517.3	581	Vienna	20.0	253.8	1,182	Gleitwitz	5.6	PORTUGAL			
also testing on 1,249 m. from 8.0 p.m. (Mon. Wed. Sat.)											
BELGIUM											
206	1,456	Antwerp	0.4	259.3	1,157	Leipzig	2.3	290.5	1,033	Lisbon (CTIAA)	2.0
245.2	1,223	Schaerbeek	0.2	269.8	1,112	Bremen	0.3	also on 42.9 m.			
338.2	887	Brussels (No. 2)	20.0	270.5	1,085	Heilsberg	75.0	ROMANIA			
508.5	590	Brussels (No. 1)	20.0	283.6	1,058	Magdeburg	0.6	394	761	Bucharest	16.0
BULGARIA											
318.8	941	Sofia (Rodno Radio)	1.0	283.6	1,058	Berlin (E)	0.6	RUSSIA			
CZECHO-SLOVAKIA											
263	1,139	Moravska-Ostrava	11.0	318.8	941	Dresden	0.3	427	702.5	Kharkov	25.0
270.5	1,073	Bratislava	14.0	325	923	Breslau	1.7	720	416.6	Moscow (PTT)	20.0
294.1	1,020	Kosice	2.5	360	833	Mühlacker	75.0	800	375	Kiev	20.0
341.7	878	Brunn (Brno)	34.0	372	806	Hamburg	1.7	937.5	320	Kharkov (RV20)	25.0
487	617	Prague	5.5	390	770	Frankfurt	1.7	1,000	300	Leningrad	100.0
DENMARK											
281	1,067	Copenhagen	1.0	418	716	Berlin	1.7	1,060	283	Tiflis	10.0
1,153	263	Kalundborg	10.0	452.1	662	Danzig	0.2	1,073	279.0	Rostov Don	4.0
ESTONIA											
296.1	1,013	Tallinn	0.7	473	635	Langenberg	17.0	1,103	272	Moscow Popoff	40.0
405.8	644	Tartu	0.5	533	563	Munich	1.7	1,304	230	Moscow (Trades Unions)	105.0
FINLAND											
220.8	1,358.3	Helsinki	15.0	559.7	536	Kaiserslautern	1.0	1,481	202.5	Moscow (Kom)	40.0
291	1,031	Tampere	1.0	568	530	Hanover	0.3	SPAIN			
291	1,031	Viiipuri	15.0	570	527	Freiburg	0.35	255.3	1,175	Barcelona (EAJ15)	1.0
1,706	167	Lahti	54.0	1,635	183.5	Zeesen	75.0	266.1	1,125	Valencia (EAJ13)	8.0
FRANCE											
219.9	1,364	Béziers	0.6	1,635	183.5	Norddeich	10.0	349	860	Barcelona (EAJ1)	8.0
221.4	1,355	Fécamp	5.0	HOLLAND							
237.2	1,265	Nimes	1.0	31.28	9,599	Eindhoven (PCJ)	30.0	368.1	815	Seville (EAJ5)	1.5
238.5	1,258	Bordeaux	1.0	298.8	1,004	Huizen	8.5	424	707	Madrid (EAJ7)	2.0
Sud-Ouest											
251.3	1,193.8	Juan-les-Pins	0.5	298.8	1,004	Radio Idzerda (The Hague)	3.0	453.2	662	San Sebastian (EAJ8)	0.8
255	1,175	Toulouse (PTT)	1.0	1,053	285	Scheveningen-Haven	10.0	SWEDEN			
265.4	1,130	Lille (PTT)	15.0	1,875	160	Hilversum	8.5	230.3	1,304	Malmö	0.75
272	1,103	Rennes	1.2	560	545	Budapest	23.0	237	1,166	Hörby	15.0
284.0	1,054	Montpellier	2.0	HUNGARY							
287	1,045.5	Radio Lyons	0.5	1,200	250	Reykjavik	21.0	306.9	977.2	Falun	0.65
293	1,022	Limoges (PTT)	0.5	ICELAND							
304	936	Bordeaux (PTT)	20.0	224.4	1,337	Cork (6CK)	1.5	322	932	Göteborg	15.0
314.3	954.5	Natan-Vitus (Paris)	0.5	413	725	Dublin (2RN)	1.5	436	689	Stockholm	75.0
ITALY											
IRISH FREE STATE											
25.4 Rome (3RO) ... 9.0											
247.7 1,211 Trieste ... 8.0											
296.4 1,012 Turin (Torino) ... 8.5											
312.8 959 Genoa (Genova) ... 1.5											
332 905 Naples (Napoli) ... 1.7											
441 650 Rome (Roma) ... 75.0											
453.2 662 Bolzano (IBZ) ... 0.2											
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LATVIA											
625 572 Riga ... 13.0											
LITHUANIA											
1,035 155 Kaunas ... 7.0											
NORTH AFRICA											
303.4 825.3 Algiers (PTT) ... 13.0											

Planning for the autumn, the B.B.C. intends to be very active as regards Highland affairs in Scotland. There is to be a further series of concerts under the title of "Our Heritage of Highland Song," and the experimental introduction of Gaelic lessons.

The French Ministry of Posts and Telegraphs will shortly undertake the installation of a medium-power transmitter at Nantes, for which studios are to be established in that city as well as at Angers and Rennes.

With a view to a regular interchange of programmes with the United States, the Reichsfunk has erected a special network of transmitting and receiving aerials at Bieltz, with direct connection to the Berlin headquarters.

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RADIOGRAMS

A RUNNING commentary on the dirt-track racing at Wembley on August 14 will be relayed in the National programme.

The Southern Command Tattoo takes place at Tidworth on August 4 and again, as in previous years, excerpts from it will be relayed for National listeners. As in the case of the recent Aldershot Tattoo, which the similar function at Tidworth runs close in popular favour, Jack Payne and his B.B.C. Dance Orchestra will play from a studio during intervals in the relay.

A plan has been evolved by the Australian National Travel Association, which is the Dominion equivalent of the Travel Association of Great Britain and the Scottish Travel Association, for welcoming a large number of Scottish visitors to Australia next autumn, and Mr. H. C. Fenton will describe this scheme in a talk which he will broadcast from the Scottish stations on July 25.

The Midland Studio Chorus will be under the direction of Edgar Morgan on July 28 and August 1. Mr. Morgan is the conductor of the Darlaston Choral Society and

frequently appeared in the programmes as accompanist and solo pianist during the early Witton days of broadcasting.

The Birmingham Military Band, conducted by W. A. Clarke, gives a concert from the Birmingham studios on July 28.

July 29 brings *Made in Brummagem*, a home-made medley of humour and melody written by Graham Squiers, with music by George Barker, Fred Cecil, and Shirley Goodall. Every item in this programme was written and composed in Birmingham for Birmingham artistes. The cast includes Stainless Stephen.

Songs by the Gloucester Malé Voice Quartet will be heard during the Midland Regional ballad concert on July 30.

The Coventry Silver Band conducted by Charles Shepherd, will be heard from Midland Regional on July 31. During the concert listeners will hear Vera Ashe in comedy interludes.

Pageants are becoming as fashionable again as they were twenty years ago and on July 20, Newcastle-upon-Tyne will begin

an historical pageant. At 2.40 p.m., the Lord Mayor of Newcastle will make the opening speech, which will be relayed from the Leazes Park, where the Pageant is being held, in the North Regional programme.

Dr. Tysoe, the organist of Leeds Parish Church, will give an organ recital from York Minster on July 22 for Northern listeners.

Harry Tate and Company bring their famous sketch, "Selling a Car," to Savoy Hill for a vaudeville programme on July 21 (National).

An August Bank Holiday programme for National listeners will be devoted to reminiscences of the great Chevalier. The programme has been arranged by Doris Arnold and Edgar Lane. The latter will act as compère.

Sir James Crichton-Browne will broadcast a talk for National listeners entitled "Faraday Once More," on July 21, in connection with the Faraday Centenary Celebrations and Exhibition.

A Welsh programme for West Regional listeners will be given on July 27.

Mr. Iorwerth C. Peate broadcasts the fifth of his series, "Reminiscences of a Young Countryman," during the Welsh interlude in the Cardiff programme on July 28.

New ground will be broken on July 23, when a relay is taken from the Empire Theatre, Liverpool, of excerpts from Francis Laidler's revue, *Say it with Laughter*.

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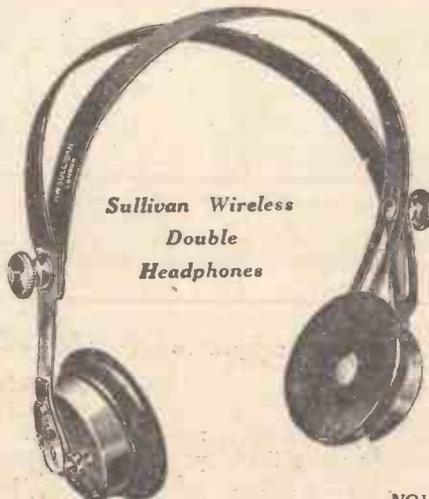
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WE have just received from Messrs. Varley Limited a range of components notable for their low price and wide application of use in home-constructed sets.

First of all, there is the Niclet low-frequency transformer, price 7s. 6d. This is one of the midget types and employs a nickel-iron alloy for the core. It is emphasized that this transformer, which has a primary inductance of 45 henries when no D.C. is flowing, can be used with straight-

Next there is the Nichoke 2, listed at 10s. 6d. This also employs the nickel-iron alloy for the core, but it has been specially treated to avoid deterioration with use. The inductance is from 14 to 20 henries and the maximum D.C. is 50 milliamperes.

Then we have the Varley Junior choke, wound on the multi-cellular principle, price 3s. 6d. This should prove a useful component, for its inductance is 120,000 microhenries and its D.C. resistance 350 ohms.

It covers all medium and long wavelengths.

A new range of Varley Popular resistances have been introduced. All the Popular resistances are wire wound, at prices ranging from 3s. to 5s. 6d., in resistances from 5,000 ohms to 300,000 ohms. These prices include a universal holder and are subject to a deduction of 1s. 6d. if the holder is not required.

In addition to the wire-wound resistances, there are now Varley Spaghetti resistances and tag resistances, both types costing only a few pence each.

The great reduction in component prices indicated by the above announcements should go a long way towards still further popularising home construction. We congratulate Varley on their notable developments.



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