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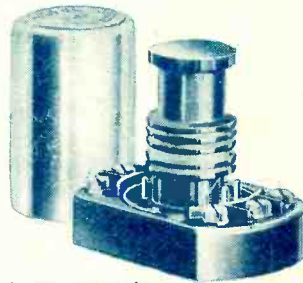
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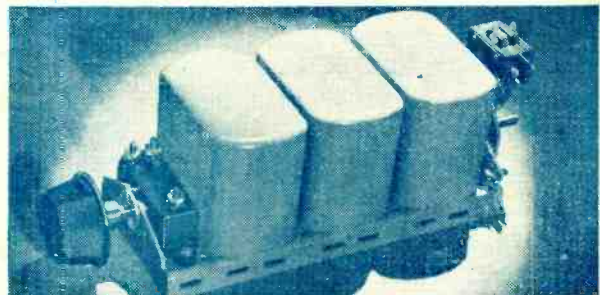


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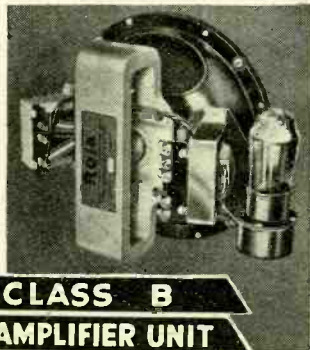
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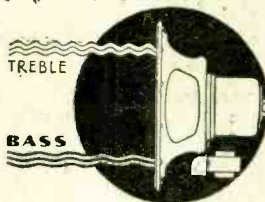
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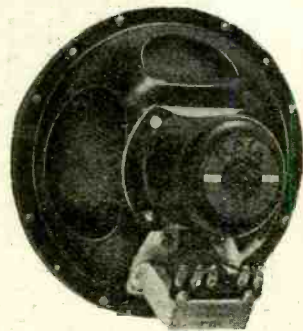
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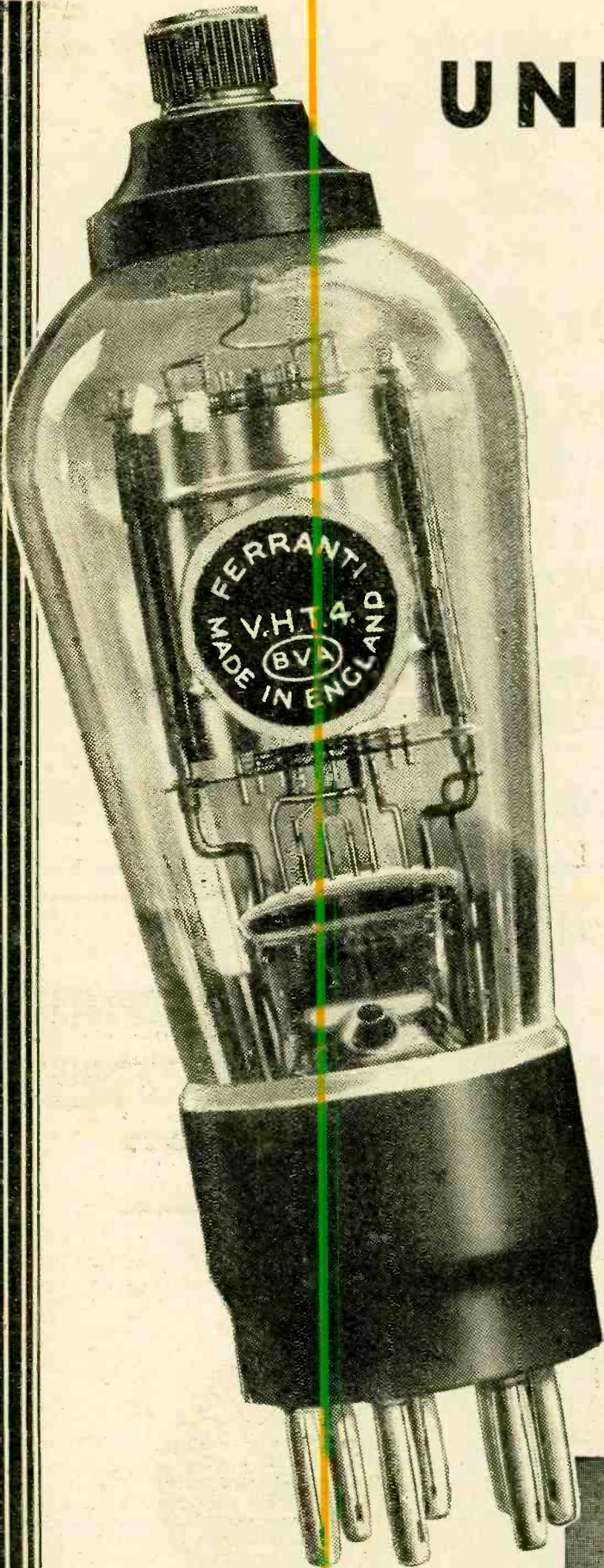
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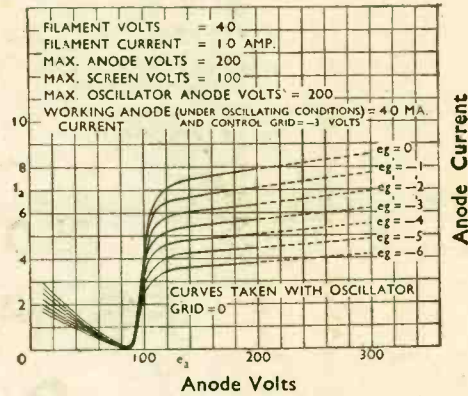




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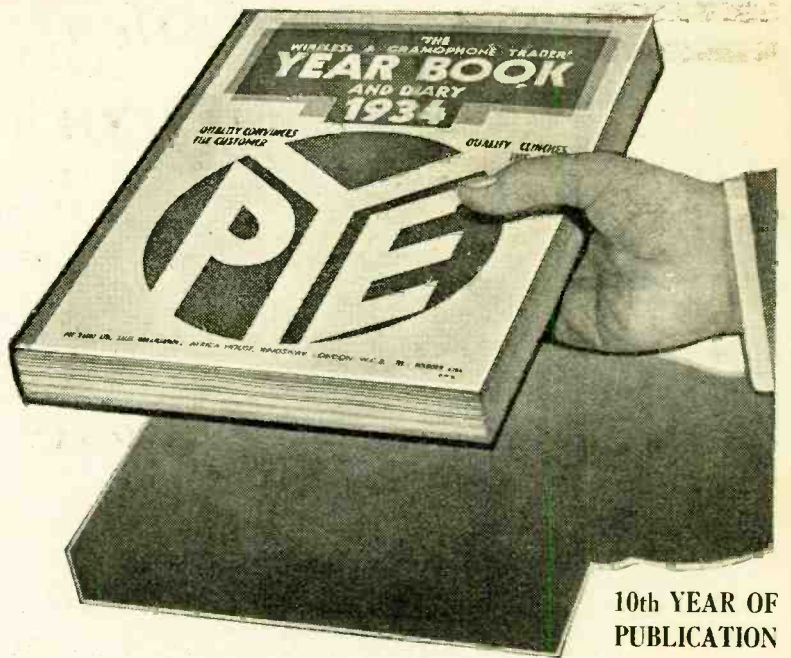
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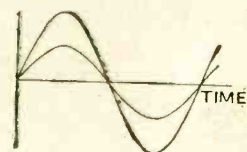
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 from the
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Impulse Excitation. Method of starting *high-frequency oscillations* in an aerial system or *oscillatory circuit* by a sudden surge, e.g., a spark, and not by applying an oscillating voltage of the same frequency as that of the tuned circuit. Sometimes called "shock excitation."

In Phase. Two alternating quantities are said to be "in phase" if they have the same frequency and pass through their respective maximum and zero values at the same instants. The definition applies only where the two waves



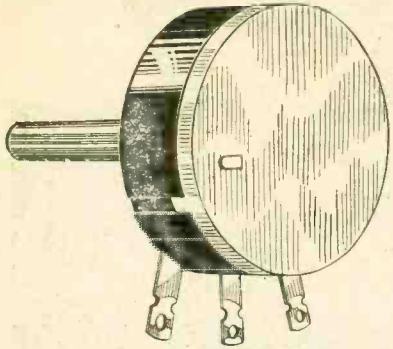
Sine waves in phase.

are of the same shape. See **PHASE DIFFERENCE.**

Indirectly-heated Valve. The type of valve in which the cathode is indirectly heated by a separate heater resistance, the cathode being a hollow cylinder to accommodate the heater within it. The heater may be supplied with A.C. or D.C.

Induced Current. A current produced in a circuit by an *induced E.M.F.*, i.e., by a changing of the magnetic flux linked with the circuit.

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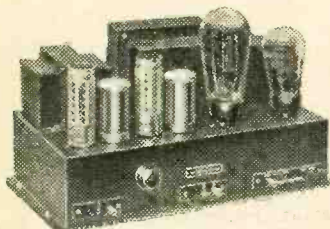
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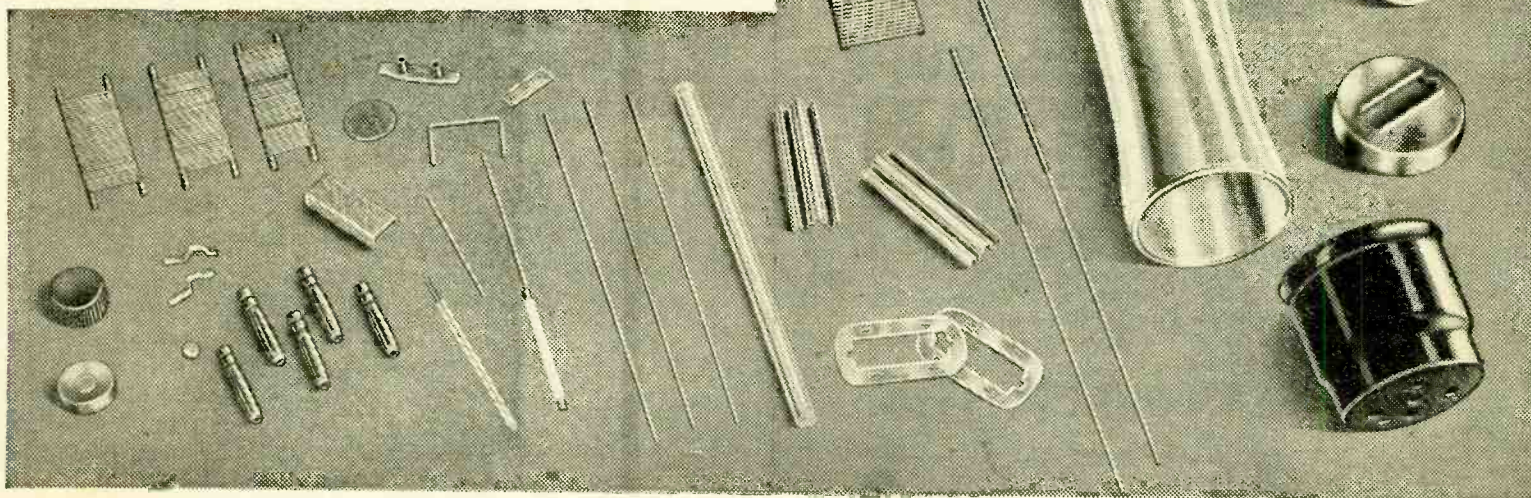
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The Wireless World

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23rd Year of Publication

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As many of the circuits and apparatus described in these pages are covered by patents, readers are advised, before making use of them, to satisfy themselves that they would not be infringing patents.

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EDITORIAL COMMENT

The Everyman A.C.

Super

Confidently Recommended to Our Readers

EVERYONE nowadays wants a superhet. Yet, some years ago the superheterodyne principle had been relegated to the archives of history and was generally regarded as a type of receiver of academic interest but of very little practical use for broadcast reception, chiefly because of difficulties in the way of attaining good quality. It was *The Wireless World* which revived the superheterodyne in this country. Both by theoretical articles and practical interpretations, *The Wireless World* proved conclusively that the disadvantages hitherto regarded as inherent in the principle could all be overcome, or even turned to special advantage, by careful design and by making use of more recent developments.

At the time that we championed the return of the superhet it was regarded as a bold step to take, so strong was the prejudice against receivers of this type; but one need not look far to-day to realise that the superheterodyne has not only returned to favour, but is rapidly taking the place of other types of receivers because of the present day need for extreme selectivity with sensitivity.

Experience Tells

The Wireless World has now had a long experience in designing superheterodynes of a variety of types, and each one has achieved outstanding popularity and has set a standard for a receiver of its kind. We have felt for some time that there was a growing need for a popular design which would

be comparatively inexpensive and yet, by making use of all the latest contributions in the way of improved valves and other components, would be outstanding in performance; a design which has, in fact, been achieved in the Everyman A.C. Super, which is described in this issue.

We make it our business to keep in touch with what is being produced in the way of designs for home construction generally, and this knowledge only serves to enhance our own opinion as to the outstanding merits of this receiver, which we can therefore recommend to our readers with the utmost confidence. Every care has been taken in design to make the construction simple and straightforward, whilst the illustrations bear testimony to the attractive appearance of the finished product.

Cabinet Design

Response to Our Invitation

IN a recent issue we invited readers to send us their personal suggestions or preferences for accommodating the wireless receiver, and we take this opportunity of saying that a very interesting collection of material has been received in our offices which it is our intention to make the subject of an illustrated article in an early issue. The material is at present being prepared for publication, and whilst it will not be possible to deal with every suggestion put forward, we are choosing those which seem to us to show the greatest originality or merit. We are arranging to include with the descriptions sketches to illustrate the ideas. When this article has appeared it will be interesting to receive further comments from readers in criticism of the suggestions put forward.

The Wireless World

Everyman A.C. Super

A Four-valve Superheterodyne with A.V.C.

By W. T. COCKING

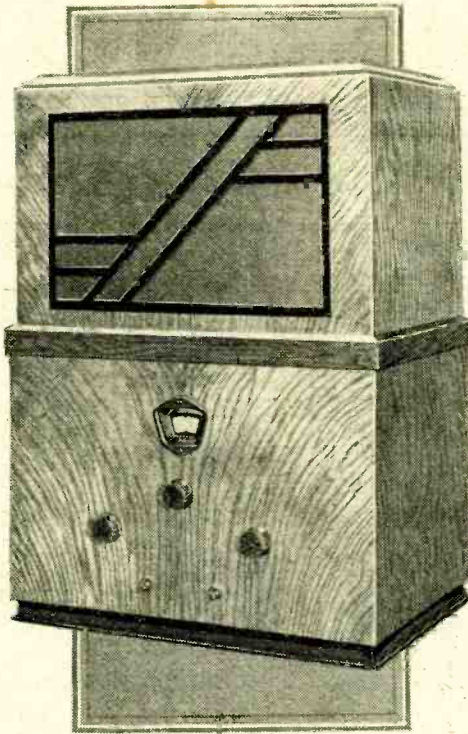
THE idea is somewhat prevalent that the superheterodyne principle is fully applicable only to a large and ambitious receiver, and that if it be applied to a small set of four valves or so it loses much of its value. While this may have been true of early designs, it is no longer so, for valve and detector development has been such as to permit a reduction in the number of valves and yet to retain the performance hitherto associated with five or six valve receivers.

The most notable advance in superheterodyne technique during recent months has been the appearance of the Heptode or Pentagrid valve, for this performs the functions of the first detector and oscillator with the saving of a valve and an actual increase in efficiency and stability. Both from the technical and the economical standpoints, therefore, it is an advantage.

A four-valve superheterodyne of a year ago would almost inevitably have had its valves arranged as detector-oscillator, I.F. stage, 2nd detector, and output. The detector-oscillator would have been a bi-grid, self-neutralised pentode, or screen-grid valve and would inevitably have given a performance below that of a two-valve arrangement. The 2nd detector would probably have been of the grid type, working with quite a small input, and hence giving a certain amount of distortion on deep modulation.

Modern Technique

In a modern design a diode type detector operated at a large input can be used to feed the output valve directly, and since a metal rectifier can be employed a valve becomes unnecessary. The output valve and the I.F. stage, of course, are retained and account for two out of the total of four valves. The frequency changer is of the Heptode type, so that the use of a single valve at this point is advantageous rather than otherwise. On account of the fact that a diode type second detector gives no amplification, while the grid detector may give a gain of over thirty times, an additional stage is necessary in order to maintain the sensitivity at a high figure. Since a valve has been saved in the detector stage, this is quite possible without exceeding a total of four, and it is naturally employed as an H.F. amplifier where it is beneficial in



helping to avoid background hiss. A modern four-valve superheterodyne, therefore, has its valves arranged as an H.F. stage, frequency-changer, I.F. stage, and power output.

The complete circuit diagram is shown in Fig. 1, and it will be noted that delayed automatic volume control is obtained—a further advance which would have been almost impossible in the older type of receiver. The H.F. valve is preceded by a

MODERN superheterodyne development shows two distinct tendencies. On the one hand there is the trend towards the large receiver in which every possible refinement is included, with cost and the number of valves receiving little consideration, and on the other there is the development of the small set of only four valves, which is relatively inexpensive, but which combines a degree of selectivity and sensitivity sufficient for all but the most exacting with a high standard of quality of reproduction. When it is said that effective A.V.C., and an output of over 3 watts are included in addition, it will be realised that in spite of its small size there is nothing small about its performance.

single tuned circuit and coupled to the tetrode portion of the frequency-changer by an H.F. transformer, so that two tuned circuits precede the frequency-changer and render second channel inter-

ference negligible under most circumstances. The grid connection to the H.F. valve, which is of the H.F. pentode type, is completed through the 0.0001 mfd. condenser C1 and the bias is applied through the 2 megohms grid leak R1. A similar arrangement is adopted for the frequency-changer, the bias of which is fed through the 2 megohms resistance R2, the grid being isolated by the 0.0001 mfd. condenser C2.

In the oscillator section a normal arrangement is employed with a grid circuit tuned by a section of the gang condenser having specially shaped plates. Here, again, the grid condenser C3 has a value of 0.0001 mfd., while the grid leak, the flow of grid current along which produces the bias, is given a value of 0.25 megohm. On the long waveband the padding condenser C4 is automatically introduced by the switching.

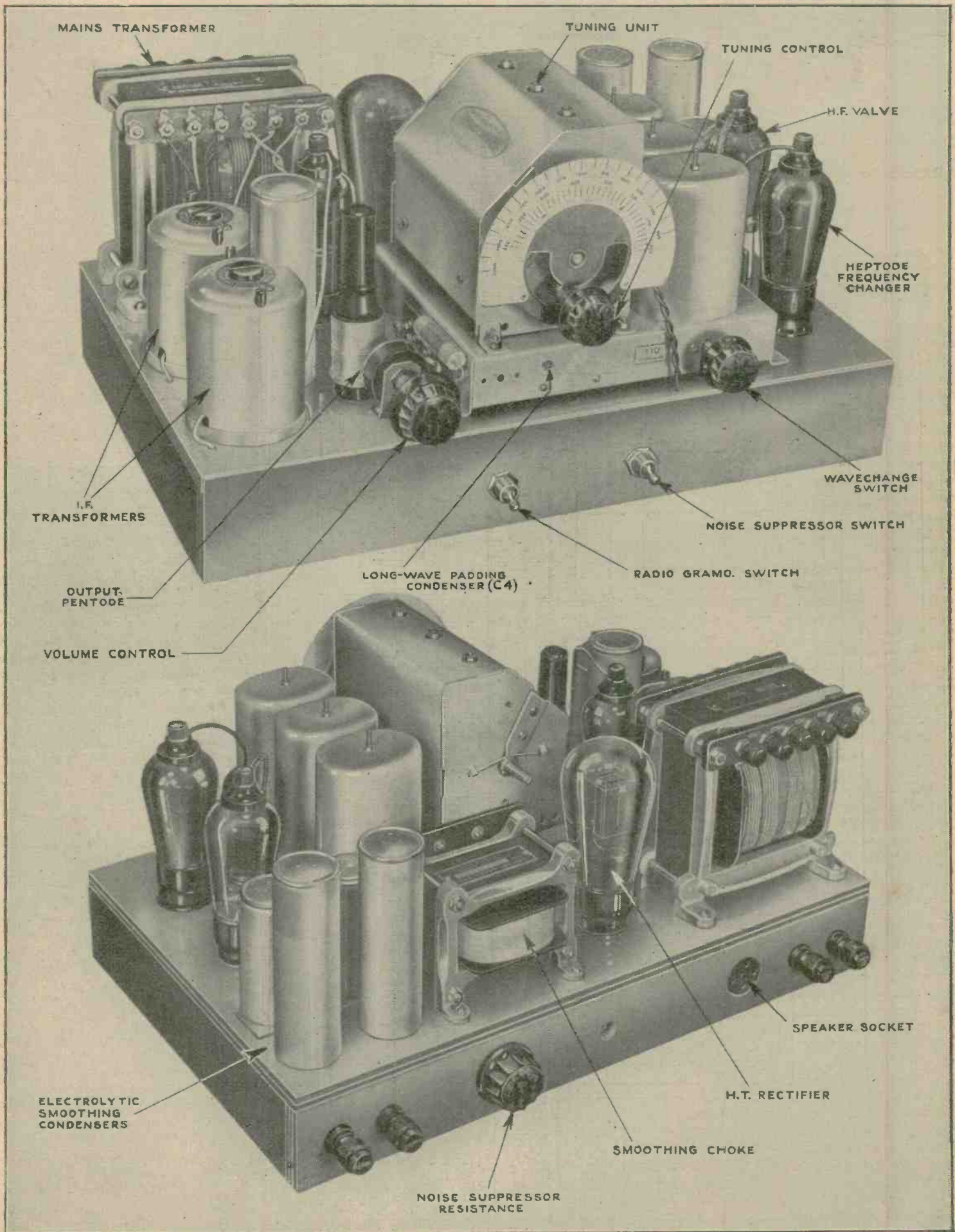
The A.V.C. System

The coupling between the frequency-changer and the I.F. valve is by means of an iron-core transformer having a tapped secondary in order to maintain stability. The transformer is of the band-pass type, and provision is made for adjusting the coupling. A similar transformer, also with a tapped secondary, is used for the coupling between the I.F. valve and the second detector.

Two Westectors are used at this stage, one as the second detector, and the other for providing delayed A.V.C. Since their positive terminals are joined together, a single push-pull type component is actually used, but it functions exactly as two separate detectors. The first Westector acts to provide the L.F. output which appears across R12, and is applied through the I.F. filter comprising Ch1, C10, and C11 to the output valve. The I.F. potentials across the last I.F. transformer secondary are also applied through the 0.0002-mfd. condenser C12 to the second Westector. Now, this rectifier is biased negatively by the amount of the output valve grid bias, so that rectification does not occur until the signal voltage exceeds this figure. When it does, a potential, the value of which depends upon the excess of the signal over the delay voltages, appears across the 1-megohm load resistance R14. This potential is applied as A.V.C. bias through the filter R13 and C9 to the grids of the H.F. frequency-changer, and I.F. valves. By virtue of the large input at which the detector is normally worked, some 10 to 20 volts, and the high delay voltage which can consequently be used, the action of automatic volume control is exceptionally good.

The input to the output valve at first

A SET EMBODYING THE MOST RECENT SUPERHET IMPROVEMENTS



The inclusion of a noise suppressor circuit in conjunction with A.V.C. enables the background disturbances to be diminished while the set is being tuned.

THE CIRCUIT DIAGRAM

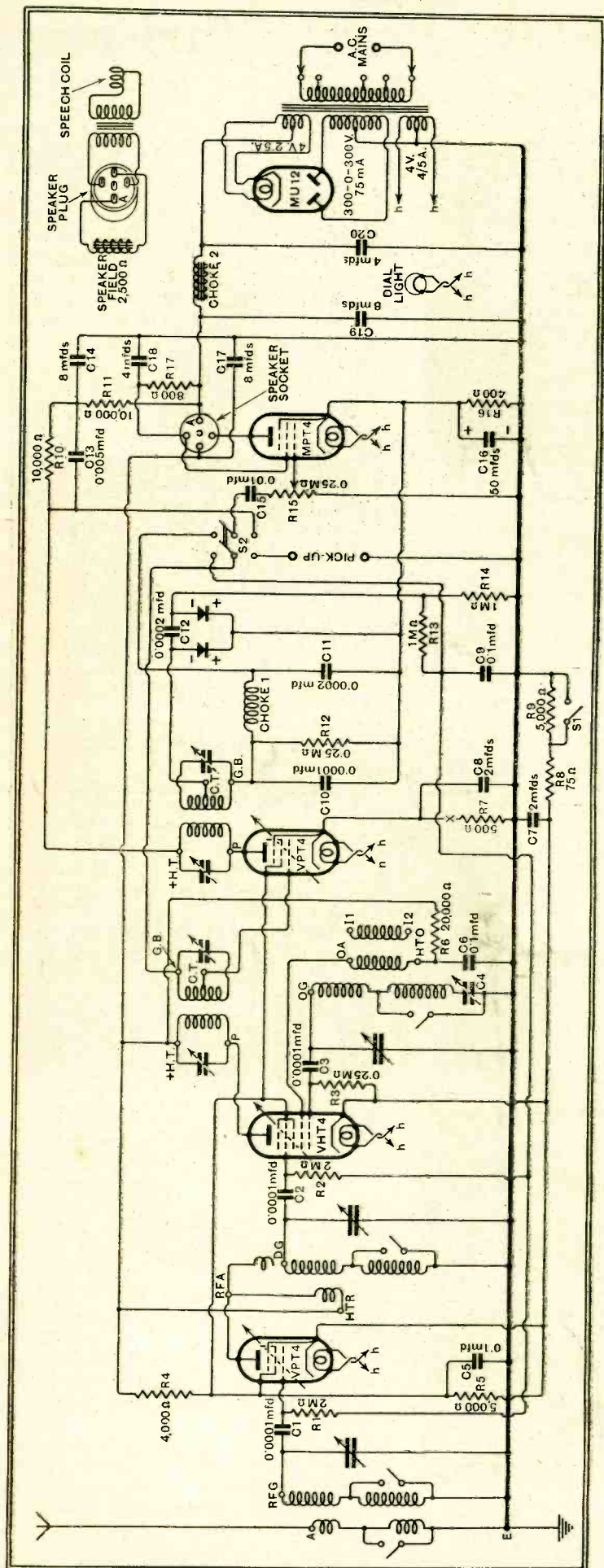


Fig. 1.—The complete circuit diagram of the Everyman A.C. Super showing the essentially straightforward arrangement of apparatus which represents sound practice

appears a little complicated, but this is due solely to the switching necessary to permit the use of a gramophone pick-up. On radio the switch S2 is closed in the upper position on the diagram of Fig. 1, and it will be seen that the L.F. output of the detector is applied to the output valve grid through the 0.01-mfd. coupling condenser C15 and the manual volume control R15. This potentiometer has a value of 0.25 megohm, and is of the tapered type to permit an even variation of volume.

Since the output valve requires an input of over ten volts for full volume, and no L.F. amplification is used, a pick-up cannot be employed directly. The only simple way out of the difficulty is to arrange the circuit so that the I.F. valve is converted into an L.F. stage for gramophone only. The anode circuit of this valve, therefore, contains an L.F. coupling, and this consists of the 10,000 ohms resistance R11 shunted by the 0.005-mfd. condenser C13. In order to avoid motor-boating, decoupling is necessary, and the components must have values effective at low frequencies. A 10,000 ohms resistance R11 is used, therefore, with an 8-mfd. condenser C14. The radio-gramophone switch S2 changes over the output valve grid connection from the second detector output to the I.F. valve anode circuit, and inserts the pick-up in the control grid circuit, at the same time disconnecting the A.V.C. bias from this stage.

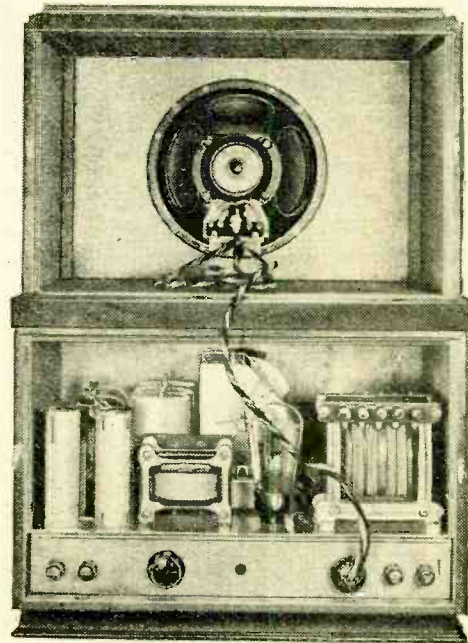
The mains equipment consists of the mains transformer which feeds the indirectly heated rectifier, giving an output of about 300 volts at 75mA. The reservoir condenser C20 has the usual value of 4 mfd., and is of the electrolytic type. Initial smoothing is

provided by the 10 henry choke Ch2 in conjunction with the 8-mfd. condenser C19. The voltage available at this point is rather higher than the 263 volts required by the output valve for anode and bias supplies, so that the difference is dropped by the 800 ohms resistance R17, after which a further 4-mfd. condenser is connected. The current for the early stages is fed through the 2,500 ohms speaker field, which provides further smoothing with the 8-mfd. condenser C17. The potential of the main H.T. line is thus about 200 volts, and the anodes of the H.F. and frequency changer valves are fed directly from this and the oscillator anode through the 20,000 ohms resistance R6. A potentiometer built from the resistances R4 and R5 is connected between the H.T. line and the common cathodes of the first two valves, and the screen supply of 100 volts is tapped off from their junction. The two first valves are initially biased by the drop along the 75 ohms resistance R8 (actually two parallel connected 150 ohms resistances) when the noise suppressor switch S1 is closed.

Owing to the necessity for including resistances in the I.F. valve anode circuit it cannot be fed from the 200 volts line, and the full output of the mains equipment is consequently fed to it. Since the normal anode current of the VPT4 is 5 mA, there is a drop of 100 volts along R10 and R11, and the actual anode potential of the valve is 200 volts.

The assembly of the components, wiring up, and the operation of the receiver, will be dealt with in next week's issue.

A complete list of the component parts required to build this receiver will be found on page 484.



Back view of the receiver housed in the complete cabinet assembly

The Electronic Organ at "Poste Parisien"

Triode Oscillations and Filtered Harmonics

By R. RAVEN-HART

MANY readers of *The Wireless World* who have heard recitals on the peculiar organ at "Poste Parisien" must have wondered how the very remarkable tonal effects are obtained. The organ has three manuals, each of four and a half octaves, together with two and a half octaves of pedals, making a total of two hundred notes. For each of these notes a triode is provided, with its associated oscillatory circuit, this comprising a fixed condenser and an iron-cored inductance. Tuning is effected within narrow limits by a screw adjustment of the iron core. This method would appear to be much simpler than tuning an ordinary organ, but it would be interesting to know to what extent variations in supply voltage, valve ageing, and the like affect the tuning.

Another 200 triodes are fitted in the amplifiers, which feed thirteen loud speakers. There are seventy-six registers, of which sixty-six are electronic and the other ten (mostly "effects") pneumatic. Altogether, including couplers, there are ninety-five stops, and it has been said that there is a close similarity between the resources of this organ and the very large and famous instrument at Notre Dame, although the latter, presumably, does not include drums, rattles, triangles, castanets, an auto-horn or a steam whistle!

Tone quality, it is officially explained, is produced by reason of the fact that the wave forms of the oscillatory circuits are very rich in harmonics, and that the "stops" actuate groups of filters which remove various harmonics to introduce changes in tone-colour. The question of "attack" seems to have received no attention, the depression of a note of the keyboard merely starting the valve oscillating, so that, whatever register is in use, the sound commences in exactly the same manner. This appears to be a serious disadvantage, for it is well known that a considerable part of the tone-colour effect depends on the attack or beginning of the note; if, for example, a trumpet register has the same smooth attack as that of a flute stop, no amount of filtration will restore the full difference of tone-colour.

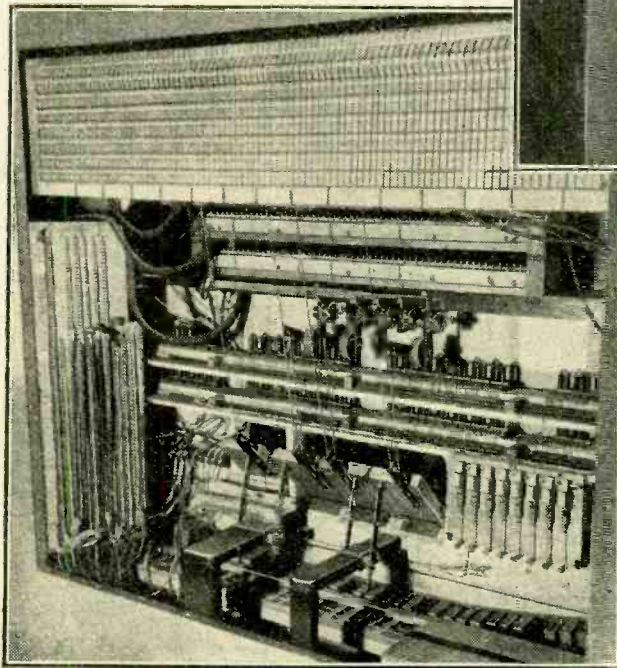
Points in favour of the new instrument include the "swell" action, with pedal-operated rheostat, applied to the whole of the organ, and not only to one or, more



M. Couplex, constructor of the organ, at the keyboard. With him is M. Givelet, the inventor and designer.

(Right) The bank of 400 valves, 200 of which are amplifiers. Variation in tone-colour is obtained by means of harmonic filters.

(Below) The interior of the playing console. Note the pedal-operated rheostat for obtaining a "swell" effect.



rarely, two manuals, as in the case of the normal organ. This is a really important improvement, provided that it does not tend to sentimental playing of the cinema-organ type. Again, the response of the oscillatory circuit to the depression of the key being practically in-

stantaneous, a note can be repeated rapidly in a manner not possible with pipes, especially in the lower registers. Consequently, more music should become available for the organ without transcription, and composers can write passages of a nature that up till now would have been unplayable. Whether this is any great advantage, leading as it does chiefly towards an increase of floridity, may perhaps be questioned.

A point of especial interest in the case of the Poste Parisien organ is that trans-

mission by wireless comes direct, it being obviously unnecessary to convert electrical into acoustical energy by means of the loud speakers when performing "on the air."

A very attractive advantage is the ease with which auxiliary "organs" can be fitted. If the normal organ is at the west end of a church and a similar organ is needed for accompanying the choir, or, if echo effects are desired, all that would be necessary in the case of an electronic instrument would be the installation of an extra group of loud speakers suitably situated.

Probably, however, the outstanding advantage of the new instrument is its extreme compactness. The console is of normal size, the loud speakers can be installed quite unobtrusively, while the 400 valves with all their associated coils, condensers, etc., take up a total space of only about 6 x 8 x 1ft.—about an eighth of the space occupied by the new organ at Broadcasting House!

Practical HINTS AND TIPS

AIDS TO BETTER RECEPTION

IT is probably due to the increasing use of metal for receiver chassis that accidental contacts between anode-circuit wiring and earth seem to be becoming rather more common. It is not the purpose of this note to decry the use of metal,

Tracing Short-circuits.

which has obvious attractions, but to draw attention, in passing, to the need for proper insulation where wires pass through or in close proximity to the metal work, and also to describe the best method of locating a short-circuit if need should arise.

As a rule, the quickest way of finding the "short" will be to disconnect entirely the source of H.T. supply, and then to connect a fairly sensitive continuity indicator—such as a volt-meter and a small battery—between the H.T. positive and H.T. negative lines of the set. If there is a potentiometer for regulating screening grid voltage it should be disconnected as well. Having done this, it can be definitely assumed that any deflection of the test indicator shows a "short" somewhere in the anode circuits. The question is, where?

The quickest way to find out is to disconnect in turn the H.T. supply leads for each individual valve, watching the indicator at the same time. When a lack of continuity is shown we know that the short-circuit is associated with the particular valve of which the feed lead has just been disconnected.

Assuming, for the sake of illustration, that the detector valve is found to be at fault, we may proceed on the lines indicated in Fig. 1.

Fig. 1.—Having located the valve in which an anode short-circuit has arisen, the exact position of the fault is best found by making point-to-point tests.

still leaving the indicator in position, and after having reconnected the detector anode supply lead:—

(1) Remove the valve itself; in the unlikely event of a collapse of the internal electrode assembly, the test indicator will no longer show continuity, and we need look no farther for the fault. But if the "short" still exists, we must proceed to:—

(2) Interrupt the circuit at point A; lack of continuity now shows a fault in the valve-holder or in the condenser C1.

(3) Break the connection at point B; if continuity is now interrupted, we know that the H.F. choke or its wiring is "shorting" to earth.

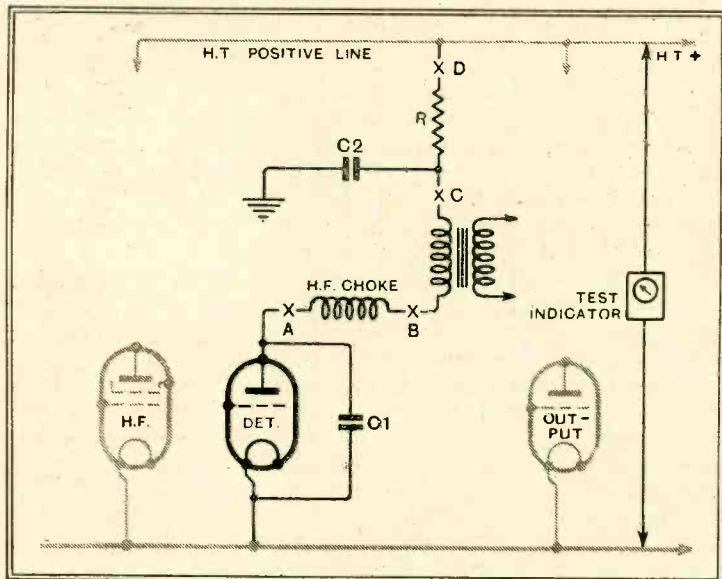
Similar tests may be carried out by interrupting the circuits at points C and D, when we shall know that, dependent on the indications given by the continuity tester, the fault may be due either to the L.F. transformer, to the decoupling resistance R, or to the condenser C2.

A test carried out logically in this manner takes much less time to execute than to describe, and will probably prove quicker in the long run than a haphazard examination of the wiring.

MOST superheterodyne short-wave converters embody a combined detector-oscillator valve, functioning on the autodyne principle, which must be in a state of self-oscillation when signals are being received. It is consequently quite a usual practice to provide fixed reaction between anode and grid circuits of this valve in order that the necessary oscillation may be produced at all tuning settings. In this way the need for

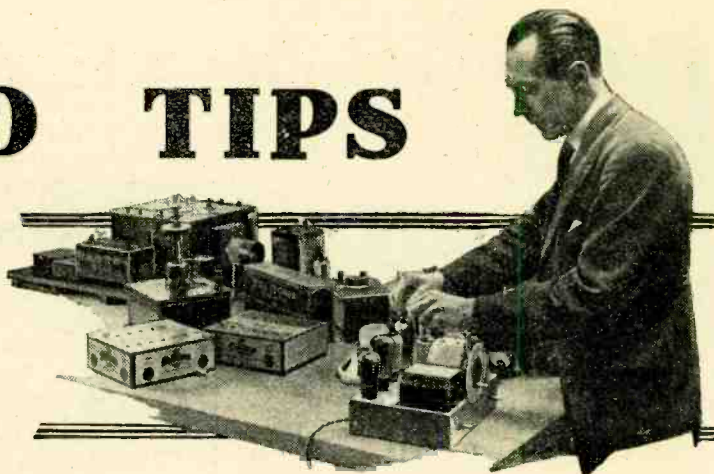
Short-wave Converters

oscillation may be produced at all tuning settings. In this way the need for



an external adjustment of reaction is avoided.

But it may be pointed out that this arrangement is in the nature of a compromise, as the valve can hardly be operating under the best conditions at all wave-



lengths. Maximum sensitivity is usually attained when the valve is only just oscillating; accordingly, those who do not object to an extra adjustment will almost always bring about some improvement by substituting a variable reaction control (generally a variable condenser) in place of the fixed coupling.

EXPERIENCE shows that the anode lead of a pentagrid or heptode frequency changer is distinctly "hot"—to use the popular slang expression. In other words, this lead carries amplified signal-frequency currents, and so particular care must be

A Lead to Watch

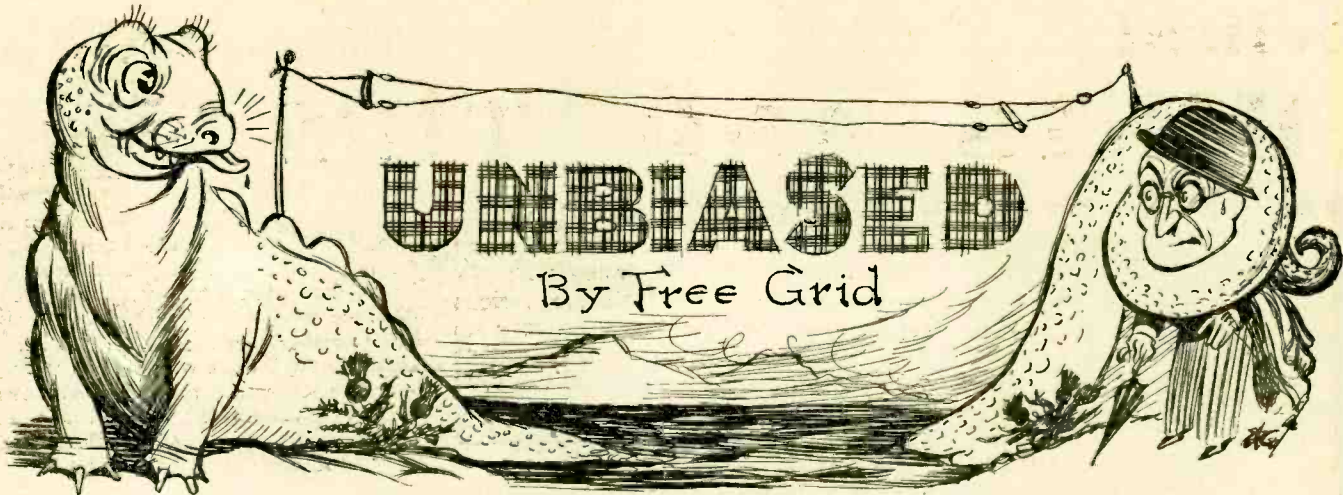
taken to dispose of it safely, especially if it happens to be long. It must not be allowed to "couple up" with the tuned circuits of a preceding H.F. stage.

When everything else fails, the anode lead may be screened, but it should be remembered that any capacity added as a result of doing this will be thrown across the primary circuit of the first I.F. transformer, and so may upset the tuning of the I.F. amplifier. In consequence, any screened connection used should be of the lowest possible self-capacity, and, further, it is worth while considering the question of screening only a portion of the lead.

IT has often been pointed out that most detector valves are habitually operated under conditions closely bordering on overloading; at any rate, in most modern sets there is seldom any great margin of safety so far as output is concerned.

Risk of Detector Overloading

This fact has an important bearing on the behaviour of a set to which a continuously variable tone-control device (operating in the L.F. amplifier) is added. The effect of all such devices is to reduce overall amplification, and so, to obtain full output, it will usually be necessary to increase the radio-frequency input to the detector. It is, therefore, not hard to see that, failing a margin of safety, this valve may easily be overloaded when the tone control is put into operation, and if possible its capacity should be increased by applying more anode voltage.



Researches into the Telearchical Diplodocus Theory

WHILE carrying out some very special wireless work in my laboratory during the past fortnight I have been pestered by parties of juvenile waits whose rudeness is only equalled by their appalling ignorance.

Thus, upon opening my front door to the last party in order to question them concerning the good King Wenceslas of whom they sang, I found that not one of them had the vaguest idea who he was. One pop-eyed little girl ventured the opinion that the Saint was related to Old King Cole who, she alleged, was hanged, drawn and quartered for burning cakes while hiding in an oakapple tree on Christmas eve, after which he never smiled again. Talking of Good King Wenceslas, Father Christmas and such like things, brings me to yet another thing

"Talking of Good King Wenceslas..."



of like-nature which is very dear to my heart. I refer, of course, to the alleged monster of Loch Ness, which has baffled our so-called men of science to such an extent that they are imagining it to be a survival of some such prehistoric creature as the homely diplodocus.

The Whistling Test

On the other hand the scoffers and the sceptics hint vaguely of tree trunks and over-indulgence in the national beverage.

So far I have not had time to track this alleged monster to its lair, but I trust that in the New Year I shall be in a position to commence certain experimental work ending in a final dramatic denoue-

ment in which I shall literally whistle the creature out of the vasty deep. It will simply be a case of "Oh whistle and I'll come to you my lad," in an entirely new setting.

The experiments will closely resemble those I carried out with a somewhat similar monster several years ago on Highgate Ponds. True my creation was considerably smaller, but so far as I recollect, it did everything that the Loch Ness creature has been reputed to do. It rested or moved along at the top of the water and even dived and went through the same evolutions under the water at my behest. Not being out for publicity or notoriety I did not deck out my contraption in any semblance of dragon or fierce-some monster of the deep.

Having no influence behind me to keep the pot boiling, and craving only to be able to pursue my researches quietly in the interests of science, I worked during the night hours, operating the key of my special short-wave transmitter in a nearby house.

Ordinary Radio Principles

My submarine contained its own reversible electric driving motors and steering and driving gear, all of which were set in motion by suitable relays operated by the transmitter.

I did not then, nor do I now, pretend that the machine derived its driving power from electric fluids in my body nor do I claim that at any time its proper functioning depended upon the state of my health or the concentration of my mind, a stunt which old readers will remember I have already exposed (new readers see page 296, "W.W.," 3/9/32.)

The whole thing was a plain and straightforward application of ordinary radio principles, more commonly known under the name of Telearchics.

Neither did I make any claim for originality in my ideas; indeed, the *Wireless World* itself had already given full construction details several weeks prior to my experiments, in which it showed the precise method of constructing a model ship which could be controlled from the shore of a pond or lake by a low-powered 90-metre trans-

mitter. The arrangement is described in a series of articles* published in "W.W." under the general title of Telearchics, and I shamelessly admit that I took my ideas from them.

However, in self defence I must add that I greatly improved upon the ship, converting it into a submarine using the famous Rogers underground and under-water antenna.

The Real Truth

It is quite evident that some jocund Scot has improved upon the idea still further by housing the mechanism in an outer casing made to resemble some frightening creature of the pre-historic swamps, while doubtless he sits in his humble butt and ben feverishly controlling its movements with his transmitter.

The result is, of course, that the whole countryside is in a furore of excitement, so-called scientists have lost what little balance they ever had and policemen have been drawn from their lawful occasions.

If the P.M.G. would only send one of his detector vans up there and make a spectacular haul it would, I feel sure, have an immense effect in restoring the public's fast waning faith in the van's efficacy to detect unlawful receivers. The van would



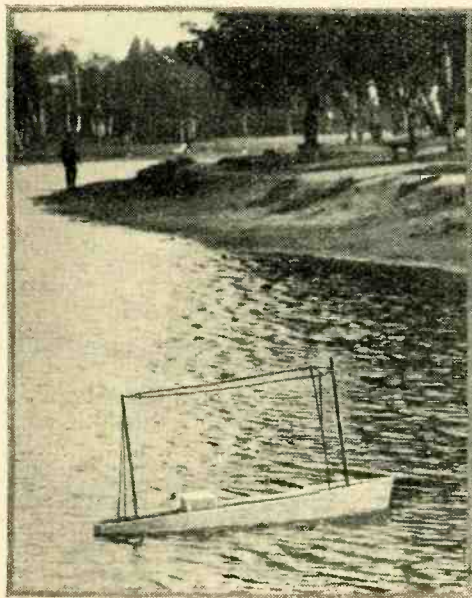
Controlling its movements.

not have to hang about until the transmitter started working; if it did, it might just as well stay at home, as the practical joker in charge of the transmitter is

* This time he is right. The articles appeared in 1926.—Ed.

Unbiased—

obviously no fool and would lie low while the van was in the neighbourhood. Owing, however, to the P.M.G.'s remarkable ability in detecting receivers he would soon locate the monster at the bottom of the loch.



The Radio Ship Telearch I on a London pond in 1926.

As, however, the P.M.G. seems unlikely to tackle the problem I am compelled to do so myself, but I claim the right to handle the thing in a spectacular manner in the interests of the journal which is

backing me. And when, after working with direction finders I locate the transmitter I shall not blow the gaff to the police or to anyone else. Instead I shall take careful observation of its wavelength and other details which will enable me to build a more powerful replica of the transmitting plant.

Needless to say, it will take me many months of patient observation with my instruments to find out all the various combinations of impulses necessary to work the many relays, but I feel sure that I shall succeed in the end, and the final denouement will, of course, be arranged when the whole of the world and his wife are in Scotland.

Then at a time appointed I shall simply whistle the monster out of the vasty deep in the sight of all men, not forgetting the B.B.C. and the Talkie News reel people. Subsequently I shall present my catch to the Science Museum.

In the meantime I shall be carrying out certain preliminary experiments with my old submarine on Highgate Ponds between 3 and 4 a.m. commencing the first week in January. Should any of you care to come along to assist me you will be given a hearty welcome. In particular I wish to get hold of an intelligent small boy—if such a thing exists—to take up his position in the submarine in order to carry out certain under-water observations while I am manoeuvring the vessel from the shore.

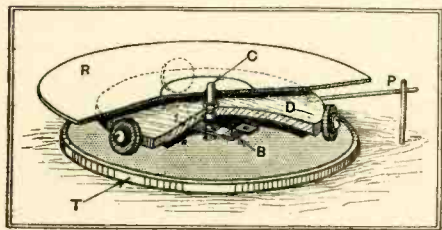
Mark your envelopes: "Supper for two; breakfast for one."

Playing Records Backwards

Outdoing the Modern Composers!

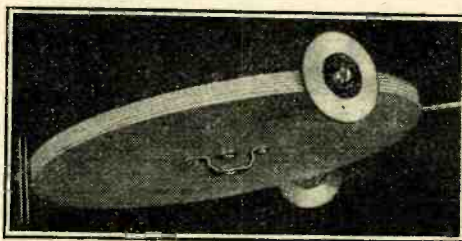
MANY cinema patrons have been mystified by hearing music resembling a cross between a concertina and a violin. The mystification is further increased when it is known that this peculiar music results from running a pianoforte sound-film backwards! When a reel is run in the correct direction, each isolated note is heard as a sharp "ping," followed by the note slowly decreasing in volume. When the film is run backwards the notes are heard as tones slowly increasing in volume and finishing with alarming suddenness. Ordinary speech sounds like a weird oriental language!

The effect is most interesting, and everybody hearing it usually wishes that they could run their gramophone records backwards to achieve the same effect. It may easily be done with simple apparatus.



Details of construction. R, Record; C, centring pin; D, wooden disc; B, metal bracket or saddle screwed to the disc. P, stop pin; T, turntable.

The main requirements are a circular or triangular piece of wood and three small wheels. Rubber umbrella rings fitted on to grooved Meccano wheels can be used, or circular erasers with metal centres, or



A simple form of reversing turntable.

even tap washers. A diameter of about 1½ in. is generally satisfactory.

The centre disc should be about eight inches in diameter, and it should be fitted with a centre pin on top to guide the record while it is being rotated by the rubber wheels. The disc is kept central on the turntable by a strip of metal with a hole in it to fit over the pin on the turntable. The natural tendency for the disc to rotate with the main turntable is prevented by a light rod projecting beyond the edge of the record and lodging against a stop pin on the motor board.

The pick-up must, of course, be temporarily raised and repositioned.

The Short-wave World

Winter Conditions on the Amateur Bands

SHORTLY after the previous set of notes under this heading was published, conditions below 30 metres underwent a considerable change for the better. That infallible "indicator," the 20-metre amateur band, has seen some very reliable long-distance work since the end of November, and conditions on the short-wave broadcast bands have, on the whole, been very good.

The short-wave broadcast stations are very well distributed about the spectrum. When conditions below 30 metres are very poor, one can generally find quite a lot of interest on the 49-metre broadcast band. If there were only a regular band allotted for broadcasting in the region of 90 metres, we could fairly claim that we were no longer dependent upon cycles of "conditions" at all.

The Best Times to Listen

While short waves have become more subject to variation in the past few years, there is little doubt that the medium-wave broadcast band has been improving steadily, and this applies, in a lesser degree, to wavelengths between 100 and 50 metres.

It seems safe to assume that the 80-metre band is fairly reliable at times when the 20-metre band is almost useless.

The novice at short-wave work should therefore make a point of learning, at the outset, how to make the best use of his receiver by listening on certain wave-bands at the most appropriate times and seasons.

As a very rough guide, it is suggested that during this winter the 49-metre broadcast band will generally be interesting between the hours of 10 p.m. and 4 a.m.; and the African stations, Johannesburg and Nairobi, will generally be heard as early as 7 p.m. with a fair degree of reliability.

There is no point whatever in spending much time below 25 metres after 6 p.m. from now until late February or March. The 20-metre amateur band is already "fading-out" by 5.30 p.m. or even earlier. When conditions maintain a steady level, it is often possible to time the fade-out within a few minutes.

A Christmas Time-table

The time of sunset varies only by a few minutes between December 15th and December 31st, and the fade-out is generally about an hour and a half later.

The 31-metre band, as might be expected, lasts much longer than the 19 or 16-metres broadcast bands, but usually fades out at this time of the year before 11 p.m.

A suggestion for a listening-schedule on Christmas Day would be on the following lines: Morning—anything that sounds interesting, on all bands; 2 p.m. onwards, 16 and 19-metre bands; 4 p.m., 19 and 25-metre bands; 6 p.m., 31-metres band, and possibly a hope of finding Nairobi on 49 metres; late evening, 31 and 49 metres only.

The amateur bands have not been included, because all three of them, 20, 40 and 80 metres, are usually interesting right through the day until sunset, after which the two upper bands will have the monopoly.

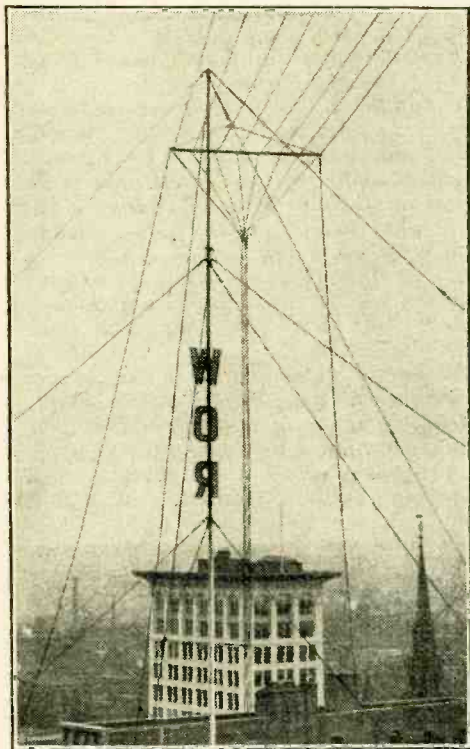
MEGACYCLE.

Ten Years Ago

How Broadcasting Stations and the Amateurs Made History

SO many radio developments have occurred in the last decade that we are tempted to forget the early achievements which made them possible. The year 1923 was remarkable as the beginning of a radio renaissance, both amateur and professional, as this article shows.

THE year 1923 belongs, not to the dark ages, but to the medieval period in wireless history, when nights were bold and days were, in consequence, dreamy. Those were the times when amateurs would gladly rise from a warm bed to hear the nasal renderings of a Long Island announcer or the querulous squeak of a Chicago cabaret band accompanied by a torrent of atmospherics.



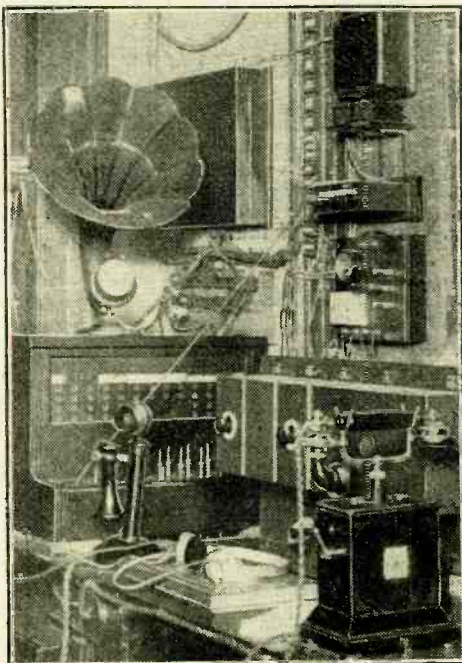
Heard in Runcorn and Halifax! WOR, Newark, N.J., which was logged by a handful of British amateurs in 1923.

It was this enthusiasm that made it possible for *The Wireless World* in December 1923—ten long years ago—to organise a transatlantic test which not only kept the American people out of bed until after midnight for a whole week, but induced the B.B.C. to operate its eight main stations until 4 and 5 in the morning! More than that: Senatore (now Marchese) Marconi and M. Georges Carpentier, the boxer, also took part, giving talks to America in the middle of the night. Much of the success of the venture was due to the enthusiasm of the engineers of the British Broadcasting Company, the chief engineer of which was Captain P. P. Eckersley.

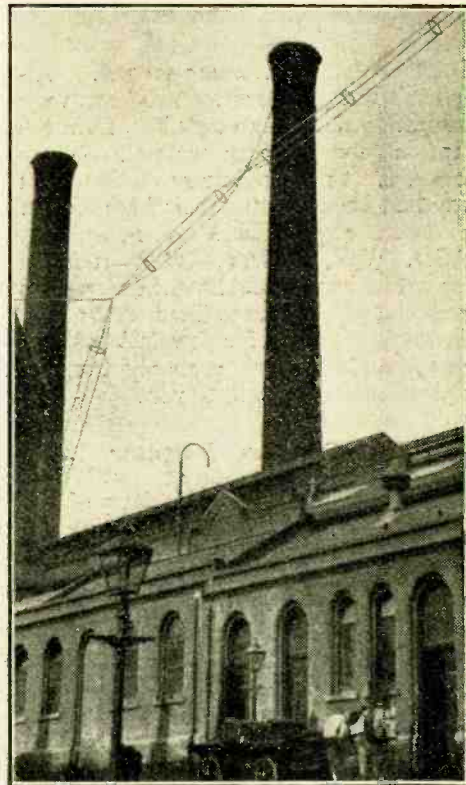
What appealed to U.S. listeners was the

fact that the Tests gave them an opportunity for the first time of hearing British stations during their more or less normal listening period between 10.45 p.m. and 12.15 a.m. (Eastern Standard Time). The ordinary British transmissions were, of course, given never later than 7 p.m. (American time), when the B.B.C. stations were usually giving their midnight closing signal. In the tests, however, which were organised by this journal in conjunction with *Radio Broadcast*, New York, the B.B.C. transmitters operated at varying periods from 3.45 a.m. to 5.15 a.m. (G.M.T.), giving the Americans every possible chance to hear them between 10.45 p.m. and 12.15 a.m. (E.S.T.). Meanwhile, America reciprocated with specially powerful transmissions between 3 and 4 a.m. (G.M.T.) on two nights, in which the novel features were microphone talks by Mr. Henry Ford and the President of the Radio Corporation of America.

The tests actually occupied five days. On November 26th the British stations transmitted. On the 27th America replied and later in the day we cabled reception reports to America. On November 28th this country again provided the transmissions and a day later America replied, the programme including the special address by the President of the Radio Corporation of America from WGY,



No, not a 10-watt amateur transmitter but the control room of the B.B.C. station at Newcastle ten years ago.



"I hear you calling me" wrote American listeners who picked up signals from 5SC, the Glasgow station of the B.B.C., seen above.

Schenectady. An attempt at two-way communication was made on December 2nd.

Enthusiasm ran high in both countries. In American listening circles—and judging from the letters there were as many women listeners as men—the excitement verged on hysteria. Granted that America had a more favourable listening time, i.e., before midnight, whereas British listeners had to stay out of bed several hours to hear from across the Atlantic, it was still obvious that the experience was more marvellous to America than to us, who were accustomed even then to the reception of multi-lingual programmes from the Continent and also to sometimes intelligible signals from across the Atlantic.

Unfortunate Coincidence

It was a pity that a shrill station in Western Canada chose the very first night of the test to carry out a special high power test on London's wavelength, for as a result, *The Wireless World* offices were deluged with letters from the Middle West gleefully reporting perfect reception of "Roses of Picardy." After a feverish and fruitless hunt among the records of everything transmitted from London, Bournemouth, Cardiff, Glasgow, Birmingham, Newcastle, Manchester and Aberdeen on the night in question, we had tactfully and tearfully to tell our American friends the truth. Nevertheless, the

Ten Years Ago—

B.B.C.'s little 1½ kW. transmitters got across, none more successfully than those of London and Newcastle.

As regards reception of American stations in this country, WGY, the G.E.C. station at Schenectady, was easily first, being received in many cases on a single valve set. WHAZ, Troy, N.Y., came second. Altogether some 500 American stations were transmitting during the tests but, from the reception reports which we were able to publish, it was too painfully obvious that many had been wasting their fragrance on the desert air. KDKA at Pittsburgh, WAOB, WJZ, WNAV, WOR—most of these with a large sprinkling of query signs—were the only others to figure in the lists, with the exception of a few isolated and little-known call signs probably born of imagination and the will to win.

The Reacting Detector

Those were the good old days of the o-v-I set with a furiously reacting detector, and it tells something of the howls which must have filled the ether o' nights that this set appears to have been the most popular and the most successful in "pulling in" the Americans.

It would be better to draw a veil over the two-way communication test on December 2nd, 1923. England spoke from 3.0 to 3.5 a.m. (G.M.T.), America from 3.5 to 3.10 a.m., England again from 3.10 to 3.15 a.m., and so on for alternate five minutes. On December 19th we wrote: "Although the last experiment cannot, by any stretch of the imagination, be considered a success (atmospheric conditions were most unfavourable), the universal opinion of British listeners points to the immense interest which the experiment aroused, and no words have been spared by our correspondents in praise of the heroic efforts of the B.B.C. engineers to 'get through,' and also to hear the American signals."

No record of the closing weeks of 1923 would be complete without a mention of amateur triumphs in transatlantic communication during the tests organised at that time by *The Wireless World* and the American Radio Relay League.

The honour of being the first European amateur to establish two-way communication with America fell to the Frenchman, M. Leon Deloy, of Nice, who exchanged signals with 1 MO, Mr. Kenneth Warner, working the station of the A.R.R.L. at Hartford, Connecticut.

A few days later, in the small hours of December 8th, dots and dashes were exchanged between 1 MO and 2 KF, the station at Merton, London, S.W., of Mr. J. A. Partridge, who, incidentally, is now in charge of the B.B.C.'s wavelength checking station at Tatsfield.

This was a fitting climax to the great amateur efforts to span the Atlantic on short waves during 1921 and 1922. It was in the latter year that the American

amateur, Paul Godley, sent to this country by the A.R.R.L., set up his receiver on the West Coast of Scotland, and, in common with a number of British amateurs, picked up the first short-wave signals across the Atlantic and thus vindicated the despised short waves in the eyes of the world at large.

Those were the pioneering days, but we shall probably be saying the same of 1933 ten years hence! E. C. T.

DISTANT RECEPTION NOTES

A DANISH reader is kind enough to write and tell me that up to the present Kalundborg has been using only 30 kilowatts (unmodulated) in the aerial. The full 60 kilowatts for which this station is designed may be used after January 15th, but it is possible that the station will continue at 30 kilowatts for a week or two on its new wavelength.

Munich will shortly be using its high-power station with a makeshift aerial. On some recent evenings there has been a noticeable increase in Munich's strength, which again suggests that tests from the new station were in progress.

Recently in an unguarded moment I wrote in these notes, without simultaneously touching wood, that fading was so rare as to be almost unknown on Budapest's wavelength. On the very next evening I found

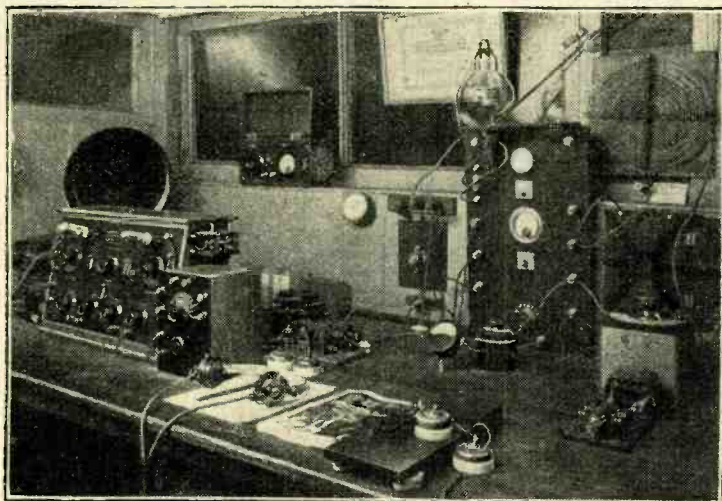
I believe, though, that the true explanation was that in my case the manual volume control was almost at the maximum position, so that there was not sufficient reserve of amplification to deal with the signal as it waned. With its more efficient collector the other set was able to bring in Budapest with the manual volume control turned a long way back.

By the time that these notes appear in print Radio-Paris will at long last have become the Emetteur National Français. During the week December 8th—17th the station remained silent pending alterations to the transmitter in preparation for the Lucerne Plan.

Reception on the long waves has been very much better of late; the only station, in fact, that has been seriously heterodyned is Luxembourg. Motala is somewhat below strength, and Kalundborg has suffered in the same way, except on the night already mentioned and a few others. Huizen has been free from the interference that was formerly such a nuisance. Radio-Paris, Zeesen and Oslo have all been well received.

The number of medium-wave stations now receivable with good quality and volume is very large on most evenings. There is a little fading, but it is seldom serious enough to spoil reception on a set provided with automatic volume control. Budapest, Vienna, Prague, Langenberg, Rome, Stockholm, Toulouse, Leipzig, Strasbourg, the Poste Parisien, Breslau, Heilsberg, Trieste and Nürnberg are probably the best stations, but Beromünster, Lyons Doua, Florence, Milan, Göteborg, Bordeaux Lafayette, Hilversum, Frankfurt, Hörby, Fécamp, Rennes and Sundsvall are all giving good reception on most evenings.

D. EXER.



With an aerial current of only 1.8 amperes, this station (J. A. Partridge, 2KF, Merton, London) established two-way communication with Hartford, Connecticut. The two-valve receiver was of the o-v-I type with a vario-coupler type of tuner.

Budapest indulging in the most violent kind of fading, the signal disappearing altogether at times.

In this connection I have something of a curiosity to report. That same evening a friend, whose house is within half a mile of mine, though on rather higher ground, was also listening to Budapest at the same time. When I mentioned the fading he was astonished, for he had held the station for an hour without a sign of it.

We were both using superheterodynes with automatic volume control, but mine was provided with a built-in frame, whilst his was worked from a suspended aerial. Bearing in mind the different ways in which these two types of collector function, I was tempted at first to wonder whether it would be possible for fading to affect a frame but not an outdoor aerial and earth system.

THE RADIO INDUSTRY

USERS of Philips sets fitted with the well-known "zone-and-number" system of tuning will not be embarrassed by the forthcoming change of wavelength. New calibration cards, showing tuning positions for all the principal stations, are available to owners who care to apply to the makers, quoting type number of set, registration number, and number of the old chart.

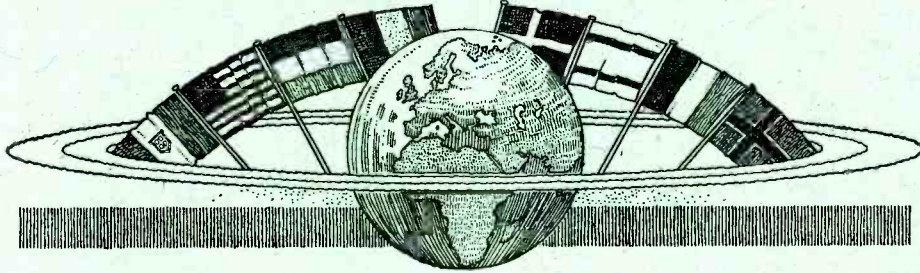
Those who are considering the question of converting their receivers for gramophone reproduction will be interested in the offer, by the Bon Marché, of Brixton, of full-sized walnut-finished radio-gramophone cabinets at the remarkably low price of 35s.

Mr. F. E. Attwood, for twenty years associated with the makers of Pye apparatus, has joined the board of C.A.C., and has already assumed the duties of sales director.

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The Wireless World

FOREIGN PROGRAMME SUPPLEMENT



SUNDAY

DECEMBER THE TWENTY-FOURTH

ALGIERS

825.5 kc/s, 363.3 metres; 13 kW.—11.30 a.m., Sacred Music. 12.30 p.m., Station Orchestra. Overture, La dame blanche (Boieldieu); Waltz, Ma Reine (Wohanka); Selection from The Barber of Seville (Rossini). 1.0 p.m., News. 1.5, Concert. Noel (Holmis); Légende du point d'argent (Fourdrain); Les Fantoccini (Lecocq). 7.0, Wind Instruments. Clarinet Solo, Canzonetta (Pierne); Clarinet Solo, Rigaudon (Lacouthe); Flute Solo, Madrigal (Gaubert); Flute Solo from Carmen (Bizet); Cornet Solo, La Préférée (Bléniant); Cornet Solo, Merle et Pison (Reymond); Tuba Solo, Mazurka Rapide (Demuynek); Tuba Solo, Eugadine (Demuynek). 7.30, Dance Music. 7.55, News. 8.0, Time Signal. 8.2, Sports Review. 8.15, The Station Orchestra, conducted by M. Henri Defosse. Overture, William Tell (Rossini); Waltz, Corbeille de Mariage (Wohanka); Selection from Carmen (Bizet). 8.45, News and Records. 9.5, Concert (contd.). Ballet Music from Faust (Gounod); Two Pieces from Peer Gynt (Grieg); March (Vallauray). 9.35, News. 9.40, Duets. 9.55, News.

ATHLONE

725 kc/s, 413 metres; 60 kW.—Relayed by Dublin, 1,382 kc/s, 217 metres, and Cork, 1,337 kc/s, 224.4 metres.—1.0 p.m. to 4.0 p.m., Programme by the I.B.C. (Ireland). Ltd. 1.0, Light Music: Waltz from Der Rosenkavalier (R. Strauss); Spanish Gypsy Dance (Marquina); Selection from Noel Coward's Bitter Sweet; Lou'siana Lullaby (Newman); Chanson (Friml); Song, Come out, Vienna (Joh. Strauss); Melodious Memories (Finck); Augero March (Franco). 1.30, Concert; Light Music: It's only a Paper Moon (Harburg); Song, On the Banks of the Rio Grande; One Alone, from The Desert Song (Romberg); Beautiful Girl (Freed). 1.45, Light Music, Potpourri, Looking Backward (Finck); Song, Smilin' through (Penn); Dancing Butterfly (Petkere); Selection from Ball at the Savoy (Abraham). 2.0, Light Orchestral Music: Throw open wide your window (Carlson); Selection from The Desert Song (Romberg); Duet, Indian Love Call (Hammerstein); Waltz from The Merry Widow (Lehar). 2.15, Orchestral Concert: Valse des Fleurs (Tchakovsky); Minuet (Boccherini); Harlequin's Serenade (Leoncavallo); Anitra's Dance (Grieg). 2.30, Military Band Music: Victoria March (Von Blon); The Skaters' Waltz (Waldteufel); A Gypsy Impression (Scott-Mitchin); Selection from The Three Musketeers (Friml); Tally Ho! (Barsotti); By the Blue Hawaiian Waters (Kettelbey); Whistling Rufus (Kerry); Marche Hongroise (Berlioz). 3.0 to 4.0, Christmas Party, by Tony Reddin and his Radiolians; Signature Tune, The Gold Digger Song; Roll up the Carpet, push back the Chairs; Story of the Old Woman who lived in a Shoe; Big Bad Wolf; A Child's Dream of Christmas; Community Medley; Monologue, Night Watchman's Story; In Old Judea; Peri-weri-winkle, I love thee; Christmas Chimes; The Stone outside Dan Murphy's Door; Piccaninnies' Heaven; Punch and Judy Show; Signature Tune, Let's call it a Day. 8.0, Relay of Chimes from the Church of the Nativity, Bethlehem. 8.15, Christmas Carols by St. Francis Xavier's Choir, Dublin. 8.45, Concert by the Station Orchestra. 9.15, Tenor Solos by Hubert Valentini. 9.30, And the Light Shined in Darkness—Nativity Play (Gabriel Fallon), with Incidental Music by Dr. Vincent O'Brien. 10.10, Sports Talk. 10.20, Christmas Songs by P. J. Duffy. 10.35, Gramophone Recital of Christmas Music. 11.0, Time and News.

BARCELONA

EAJ1, 861 kc/s, 348.4 metres; 8 kW.—7.15 a.m., Radio Journal and Gramophone Music. 8.0, Chimes. Physical Culture and Gramophone Music. 8.20, Radio Journal and Gramophone Music. 9.0, Announcements. 11.0, Chimes. Weather. 1.0 p.m., Gramophone Music. 1.30, Theatre Notes and Gramophone Music (contd.). 2.0, Sextet Concert. 3.0, Pro-

gramme for Hospitals, with Gramophone Records. 5.30, Agricultural Talk. 6.0, Concert by the Radio Orchestra. 6.30, Part Relay of an Opera from the Grau Teatro del Liceo. 9.0, Gramophone Music. 10.45, Chess Lesson.

BARI

1,112 kc/s, 269.8 metres; 20 kW.—9.0 to 9.30 a.m., Programme from Rome. 9.30, Agricultural Talk. 9.45, Religious Address. 9.58 till Close Down, Programme from Rome.

BASLE.—See Schweizerischer Landessender.

BERLIN

DEUTSCHLANDSENDER REICHSENDER, 183.5 kc/s, 1,635 metres; 60 kW.—7.55 a.m., Chimes and Divine Service. 9.5, Weather. 10.0, E. G. Kolbeuheyer reads Poetry. 10.15, Weather. 10.30, See Leipzig. 11.0, See Munich. 12.30 p.m., Music for Horns. 1.0, The German Poet and the Child—Radio Sequence with Children's Choir. 1.30, Turn Musik (Windberger) by the Station Wind Band. 2.0, A German Christmas—Programme for Young People. 2.30, The Cecilia—A Capella Choir. 3.0, The Birth of Christ—Play relayed from Oberrufer. 4.0, Vespers from a Church in Neiderschönhausen. 5.0, Christmas Programme. The Station Choir and Orchestra, and the Kosel'scher Wind Ensemble. 8.0, Christmas Address by Hitler's Deputy, Rudolf Hess. 8.15, See Leipzig. 9.15, News. 9.45, Weather. 10.0, Musical Programme. 11.0, See Leipzig. 12.20 a.m. (Monday), Reading.

BERLIN

FUNKSTUNDE, 832 kc/s, 360.5 metres; 100 kW.—Relayed by Zeesen, DJC, DJA, DJD, DJB and DJE.—9.5 a.m., Weather. 10.0 to 10.30, Reading from a Christmas Carol (Dickens). 11.0, The Small Station Orchestra, conducted by Steiner. 1.0 p.m., Records for Children. 1.45, Records. 2.30, German Poems. 2.45, A Christmas Meditation. 3.0, See Hamburg. 4.25, Christmas Music. 4.50, Reading. 5.0, Choral Concert. 6.15, See Breslau. 7.0, The Berlin Station Orchestra, conducted by Helmar Köhler, and Soloists. 8.0, Christmas Address by Hitler's Deputy, Rudolf Hess. 8.15, The Birth of Jesus and the Angels' Message to the Shepherds, from The Christmas Mystery (Wolfgramm), by the Station Choir, the Station Orchestra and Soloists. 9.0, Christmas Carols of Seventeen Countries on Records. 9.45, Christmas Eve in the City Streets, by the Freundschaft Vocal Quartet. 11.0, See Leipzig.

BERNE.—See Schweizerischer Landessender.

BEROMUNSTER.—See Schweizerischer Landessender.

BODEN.—See Stockholm.

BODO.—See Oslo.

BORDEAUX-LAFAYETTE

986 kc/s, 304 metres; 13 kW.—7.45 a.m., News and Organ Recital, relayed from Paris (Ecole Supérieure). 671 kc/s, 447.1 metres. 11.0, Concert, relayed from Paris (Ecole Supérieure). 2.0 p.m., Programme, relayed from Paris, or Relay of a Local Festival. 3.0, Concert, relayed from Paris. 6.15, Radio Journal, relayed from Paris (Ecole Supérieure). 7.45, Sports Talk. 8.0, Talk for Ex-Servicemen. 8.15, Lottery Results. 8.30, Records. 9.0, The Cricket on the Hearth—a Comedy (Ludovic de Francmesnil), after Charles Dickens, with Incidental Music by

Massenet. After the Concert, Amusement Guide and Time.

BRATISLAVA

1,073 kc/s, 279.5 metres; 14 kW.—8.20 a.m., Talk: Bethlehem. 8.40, See Prague. 10.0, See Brno. 11.0, See Prague. 1.0 to 1.5 p.m., Tide Report. 2.30, See Prague. 4.0 to 5.0, Divine Service Relay. 6.30, See Prague. 8.15, Programme of Christmas Poems and Carols. 8.40, See Brno. 9.5, See Prague. 12.30 a.m. (Monday) (approx.), Close Down.

BREMEN.—See Hamburg.

BRESLAU

923 kc/s, 325 metres; 60 kW.—Relayed by Gleiwitz, 1,185 kc/s, 253.1 metres.—9.0 a.m., Reading. 9.25, Harmonium Recital. 9.50 to 11.0, See Leipzig. 11.0, See Munich. 12.30 p.m., See Berlin (Deutschlandsender). 1.0, Reading and Songs. 1.25, News. 1.35, Discussion—A New Generation of German Women. 1.55, Songs by Children. Vom Himmel hoch Ein Weihnachtsspiel; Heiligste Nacht; Lass' uns das Kindlein wiegen; Maria Wiegenlied; O Jesulein zart; Still, stille, still; Auf dem Berge; Tochter Zion (Handel). 2.30, Christmas in Silesia—(Erich Hoinkis). 3.0, The Station Orchestra, conducted by Ewald Rischka. Overture, Martha (Flotow); Christmas Suite (Schumann-Rischka); Selection from Undine (Lortzing); Postludium (Rischka); Overture, The Princess in the Golden Slippers (Rust); Moment Musical (Schubert); Albulblatt (Wagner); Cradle Song (Jännefelt); Fröhliche Weihnachten (Koedeel). 4.55, See Leipzig. 5.0, Reading from A Christmas Carol (Charles Dickens), arranged as Radio Play with Incidental Music. 5.30, Chimes. 6.0, Talk: The Germanic Yule Festival. 6.15, North, South, East, West, Radio Reports from a Mountain Church in Silesia, the Halligkirche in Hamburg, a Forester's House near Frankfurt, and the Zugspitze near Munich. 7.0, Christmas Carols. Sieh, dort steht ein zerissen Stälchen; Gott, heil'ger Schöpfer aller Stern'; Dein grosse Lieb, o Jesulein (from Moarvia); Old German Christmas Carol; Shepherd's Christmas Carol from Bohemia; Old Flemish Carol; Alter Weihnachtssreigen (Fourteenth Century); Silesian Carol, Süßes Kind, die Zeit ist da; Austrian Carol. 7.25, See Munich. 8.0, Address by Rudolf Hess, Hitler's Deputy. 8.15, See Leipzig. 9.15 to 11.0, See Munich. 11.0, See Leipzig.

BRNO

878 kc/s, 342 metres; 35 kW.—7.0 a.m., See Bratislava. 8.0 a.m., See Moravská-Ostrava. 8.15, See Prague. 10.0, Christmas Programme. 11.0, See Prague. 2.30 p.m., See Prague. 4.0, German Transmission: Songs and Organ Music. 6.30, See Prague. 8.15, See Bratislava. 8.40, The Christmas Guest—a Tale. 9.5, See Prague.

BRUSSELS (No. 1)

I.N.R., 589 kc/s, 509.2 metres; 15 kW.—10.0 a.m., Concert by the Small Station Orchestra, conducted by Leemans. 11.0, Gramophone Concert of Popular Music. 12 Noon, Concert, conducted by Felleman, relayed from the Grand Hotel, Antwerp. 1.0 p.m., Le Journal Parlé. 1.10, Concert (contd.). 1.30, Supporters—Sketch (Lauville). 1.40, Concert (contd.). 5.0, Concert by the Station Symphony Orchestra, con-

ducted by Meulemans. 5.30 (approx.), Football Results. 6.0, Violin and Piano Recital. 6.40, Gramophone Concert of Popular Music. 7.15, Religious Address. 7.30, Le Journal Parlé. 8.0, Acts I and II of Countess Maritza—Operetta in Three Acts (Kálmán). In the first interval, Le coup de Cyrano—Radio Sketch (Tristan Bernard). In the second interval, Le Journal Parlé. 10.10, Catholic Service. 11.0, Dance Music by Robert de Kers and his Cabaret Kings, relayed from the Century Hotel, Antwerp.

BRUSSELS (No. 2)

N.I.R., 888 kc/s, 337.8 metres; 15 kW.—10.0 a.m., Gramophone Concert. 11.0, Concert by the Small Station Orchestra, conducted by Leemans. 12.0 Noon, Gramophone Concert. 12.25 p.m., Organ Recital by Joos, relayed from the Carmelite Church. 12.45, Gramophone Records. 1.0, Le Journal Parlé. 1.10, Gramophone Records. 1.15, A Christmas Story. 1.30, Organ Recital (contd.). 5.0, Concert by the Station Orchestra, conducted by Walpot. 5.45, Programme for Children. 6.30, Choral Concert. 7.12, News. 7.15, Religious Address. 7.30, Le Journal Parlé. 7.55, Music Review, followed by Van Jezus en St. Janneken (De Vocht), on Gramophone Records. 8.0, Men of Good Will—a Radio Play. 8.50, Record: Stoet (De Vocht). 8.55, Talk. 9.10, Concert by the Station Symphony Orchestra. 9.50, Evening prayer. 10.0, Le Journal Parlé. 10.10, Gramophone Records. 11.0, Christmas Service, relayed from the Abbaye des Bénédictins, Lophem. 12.0 Midnight, The Story of Christmas, from the Bible, followed by Chimes. 12.7 a.m. (Monday), Dance Music, relayed from the Century Hotel, Antwerp. 1.0 (approx.), Close Down.

BUCHAREST

760 kc/s, 394.7 metres; 12 kW.—3.0 a.m., Religious Service. 9.30, Religious Talk. 9.45, Religious Music. 10.0, Records. 11.0, Records. 12.0 Noon, Radio Journal. 12.15 p.m., Records. 3.0, Rural Programme. 4.0 Variety Music by the Marco Orchestra. 5.0, Radio Journal. 5.15, Orchestral Concert (contd.). 6.0, Educational Talk. 6.20, Records. 6.45, Talk. 7.0, Christmas Carols. 8.45, Radio Journal.

BUDAPEST

545 kc/s, 550.5 metres; 120 kW.—Also relayed on 840 metres from 4.0 p.m. till Close Down.—11.30 a.m., Concert by the Opera House Orchestra, conducted by Ernst Dohnányi. 1.0 p.m., Records. 2.0, Agricultural Programme. 2.50, Songs for Children. 3.30, For Schools. 9.0, Christmas in an Orphanage—Radio Report. 4.30, Sports Notes. 4.40, Orchestral Concert, conducted by Emil Abranyi. 5.30, Talk, with Records. 6.0, Chimes from the University Church. 8.0, Relay of the B.B.C. World Broadcast of the Bells of Bethlehem. 11.0, Midnight Mass.

CASSEL.—See Frankfurt.

COPENHAGEN

1,067 kc/s, 281 metres; 0.75 kW.—Relayed by Kalundborg, 260 kc/s, 1,153.8 metres, and Skamlebaek, OXY, on 315.1 metres.—11.0 a.m., Time and Chimes. 11.5, Concert by Louis Preil's Instrumental Ensemble. 1.30 p.m., The Radio Orchestra, conducted by Launy Gröndahl. Soloist: Eliza Herlov (Piano). 3.30, Christmas Service from Copenhagen Cathedral. 4.30, Gramophone Records. 5.0, New Christmas Carols. 5.20, Reading. 5.50, Weather. 6.0, News. 6.15, Time Signal. 6.30, Christmas Greetings from the Country to the International Radio Union; Christmas Carols, Address, and Chimes. 7.2, Christmas Concert: Franz Klaebel (Organ), Fini Henriques (Violin), Frantz Klaebel (Organ), and Volmer Holböll (Songs). 8.0, B.B.C. Broadcast from Bethlehem: Introduction by the High Commissioner of Palestine; Chimes from London, New York, Winchester Cathedral, and the Church of the Nativity in Bethlehem. 8.15, Christmas Concert (contd.).

CORK.—See Athlone.

CRACOW

959 kc/s, 312.8 metres; 1.5 kW.—8.0 a.m., See Warsaw. 8.54, Announcements. 9.0, Divine Service and Sacred Music on Gramophone Records, relayed from Lwow, 788 kc/s, 381 metres. 10.57, Time, Fanfare from St. Mary's Church. Announcements and Weather. 11.15, See Warsaw. 1.30, Records. 2.0, Talk. 2.20, See Warsaw. 4.15, Concert of Christmas Carols. 5.0, Programme, relayed from Lwow. 5.40, See Warsaw. 6.0, Announcements. 6.5, News. 6.15, Talk on Hieronymus Lubomirski. 6.30, See Warsaw. 6.45, News. 6.50, See Warsaw. 9.0, Humorous Programme, from Lwow. 10.0, See Warsaw. 10.5, Records. 11.0, Mass, relayed from the Ostra Brama, Wilno.

DANZIG.—See Heilsberg.

DRESDEN.—See Leipzig.

FECAMP

1,328 kc/s, 225.9 metres; 10 kW.—8.45 a.m., till 12 Noon, Programme in English by the I.B.C. 8.45, Military Band Music. 9.30, Orchestral Concert. 10.0, Dance Music. 11.0, Happy Hour. 12 Noon, Programme in French. 2.0, to 7.30 p.m., Programme in English by the I.B.C. 2.0, Light Music. 2.30, Orchestral Concert. 3.0, Musical Comedy Selections. 3.30, Gramophone Concert. 4.15, The I.B.C. Nursery Corner. Birthday Greetings. 4.45, My Dream, by the Rev. F. Llewellyn Hughes, M.A., M.C. 5.0, American Songs. 5.15, Orchestral Concert: The Golden Musical Box (Krame); My Hero, from The Chocolate Soldier (O. Strauss); Selection from H.M.S. Pinafore (Sullivan); Mignonette (Friml). 5.30, Light Orchestral Concert: Her First Dance (Heykens); Poem (Fibich); Venetian Boatman's Song (Mantovani); Midnight (Spoliansky). 5.45, Concert of Dance Music. We'll all go riding on a Rainbow; In the Shade of the Old Apple Tree; That Naughty Waltz; Give me liberty, or give me love. 6.0, Hawaiian Band Music; Song of the Islands (King); Aloha (Bowers); That little Lock of Hair (Berrill); Let us waltz through the Night (Miller). 6.15, Concert of Dance Music. Without that certain Thing; Tain't; Yvonne; The Monkey on a String. 6.30, Light Music. 7.0, Orchestral Concert. Ballet égyptien (Luigini); Violin Solo: Tambourin chinois (Kreisler); Entrance of the Little Fauns (Pierné); Humoresque (Dvorak); Violin Solo: Souvenir (Drdla); Ballet from Petite Suite (Debussy); Dance of the Sylphs (Berlioz); March from Sylvia (Delibes). 7.30, Programme in French. 9.0 till 11.30, Programme in English by the I.B.C. 9.0, Concert of Dance Music. 9.30, Light Music. 10.0, I.B.C. Members' Request Half-hour. The Golden Musical Box (Krame); Song: Annie Laurie (Scott); Selection from He Wanted Adventure (Waller); Violin Solo: Au mois d'avril (Adlington); Selection from Chu Chin Chow (Norton); The Capricious Music Box (Fresco); Comin' through the Rye (arr. Smart); The Clatter of the Clogs (Flynn). 10.30, Concert of Dance Music. Making Conversation: My Wild Out; This is Romance; Buckin' the Wind; Missouri Waltz; Weep no more, my Baby; Give me Liberty, or give me Love. 11.0, Organ Recital. Berceuse de Jocelyn (Godard); Intermezzo from Cavalleria rusticana (Mascagni); Melody in F (Rubinstein); La Serenata (Braga). 11.15, Concert. Signature Tune: There's nothing too good for my Baby; The Last Round-up; Just makin' Conversation; I was in the Mood; From me to you; Signature Tune. I.B.C. Time Signal. 11.30, Programme in French. 12.30 a.m. (Monday) till Close Down, Programme in English by the I.B.C. 12.30 a.m., A Noel Phantasy, from a Carol Symphony (Hutchinson). 12.35, I.B.C. Late News Bulletin in English. 12.40 (approx.), Old Time Dance Tunes: See me dance the Polka (Grossmith); Barn Dance, Happy Darkies (Godfrey); The Veleta (Morris); The Brooklyn Cakewalk (Thurban); Sir Roger de Coverley. 1.0, Club Concert for Nova Scotia Listeners: Special Request Programme. 2.0, Dance Music. 3.0, Old Dance Favourites: Sing a New Song; I want to be Happy; Lullaby of the Leaves; Live, Laugh and Love; The Flies crawled up the Window; Try a little Tenderness; Wanderer; Tea for Two; Oh, Monah; Trees; Rockin' Chair; Won't you stay to Tea? Stormy Weather; Hold me; To-day I feel so Happy; Let's put out the Lights; Signature Tune. 4.0, I.B.C. Good-night Melody and Close Down.

FLENSBURG.—See Hamburg.

FLORENCE.—See Turin.

FRANKFURT

1,157 kc/s, 259.3 metres; 17 kW. Relayd by Cassel and Trier, 1,157 kc/s, 259.3 metres.—9.15 a.m., Christmas Legend. 9.35, Records of German Singers. 10.25, Christmas Poems. 10.30, See Leipzig. 11.0, The Wiesbaden Madrigal Circle. Soloist: Paul Hauer (Songs): Christmas Carols with Lute accompaniment; Old Christmas Music for Voice and Instruments. 12.0 Noon, See Stuttgart. 12.15 p.m., Opera Music on Records; Selection from Othello (Verdi); La Traviata (Verdi); The Force of Destiny (Verdi); and Aida (Verdi). 1.0, Christmas Fairy Tales. 1.30, Programme for Children. 2.0, Concert by Children. 2.30 to 5.15, See Langenberg. 5.15, Christmas Carols by a Choir from the Blind Institute. 5.45, Organ Recital from the Ibenstadt Monastery. 6.15, See Breslau. 7.0, See Langenberg. 8.0, Christmas Address by

DEC. 24th

SUNDAY continued

Hitler's Deputy, Rudolf Hess. 8.15, See Langenberg. 9.0, Time and News. 9.10, See Stuttgart. 9.25, Alpine Christmas Carols sung by Anton Maria Topitz. 10.15, See Stuttgart. 11.0, See Langenberg. 12 Midnight, Close Down.

FREDRIKSSTAD.—See Oslo.

FREIBURG.—See Stuttgart.

GENEVA.—See Radio-Suisse Romande.

GENOA.—See Turin.

GLEIWITZ.—See Breslau.

GOTEBORG.—See Stockholm.

GRAZ.—See Vienna.

HAMAR.—See Oslo.

HAMBURG

806 kc/s, 372 metres; 1.5 kW. Relayd by Bremen, 1,112 kc/s, 269.8 metres; Flensburg, and Hanover, 1,319 kc/s, 227.4 metres; and Kiel, 1,292 kc/s, 232.2 metres.—7.15 a.m., Time, News. 9.0, Christmas Music and Recitations. 10.15, Reading of a Christmas Legend. 10.30, See Leipzig. 11.0, See Berlin (Funkstunde). 1.0, Cinderella—Pantomime (Görner). 2.0, Choral Concert, with Instrumental Solos and Songs. 2.40, Reading (Walther Förster). 3.0, Orchestral Concert, conducted by Gerhard Maass. 4.25 (from Kiel), Christmas Vespers from the University Church, Kiel. 5.25, Choral and Organ Music. 6.5, Weather. 6.15, See Breslau. 7.0, Christmas Programme. 8.0, Christmas Address by Hitler's Deputy, Rudolf Hess. 8.15, A German Christmas on the High Seas—Short Wave Transmission from the Liner Milwaukee, in the Bay of Biscay. 9.0, Variety. 10.0, Wind Instrument Concert. 11.0, See Leipzig.

HANOVER.—See Hamburg.

HEILSBURG

1,085 kc/s, 276.5 metres; 60 kW. Relayd by Danzig, 671 kc/s, 453.1 metres.—10.30 a.m., See Leipzig. 11.0, See Berlin (Funkstunde). 1.0 p.m., See Hamburg. 2.0, Reading 2.15, For Young People. 2.45, Christmas Lyrics by the German Masters. 3.0, See Hamburg. 4.0, Vespers, relayed from Hanfstrom. 4.40, Reading. 5.0, Christmas Cantata (Armin Knab), followed by Christmas Carols. 6.0, News. 6.15, See Breslau. 7.0, Christmas in Music and Literature. 8.0, Christmas Address by Hitler's Deputy, Rudolf Hess. 8.15, See Leipzig. 9.15, Organ Recital. Choral Prelude: Von Himmel kam der Engel Sehar (Buttstedt); Choral Prelude: Lobt Gott, ihr Christen allzuegleich (Buxtehude); In dulci jubilo (Bach); Wie schön leuchtet der Morgenstern (Buxtehude); Pastorale in F (Bach); Choral Prelude: Vom Himmel hoch (Pachelbel); Toccata in F (Pachelbel); Christmas (Reger); Prelude (Bach). 10.0, See Hamburg. 11.0, See Leipzig.

HILVERSUM

1,013 kc/s, 296.1 metres; 7 kW up to 5.40 p.m. and 20 kW from 5.40 p.m.—8.10 to 9.40 a.m., Programme of the Workers' Radio Society (V.A.R.A.). 8.10, Football Notes. 8.12, Horticultural Talk. 8.40, Organ Recital. 9.0, Records. 9.20, Organ Recital. 10.10 to 11.40, Programme of the Liberal Protestant Radio Society (V.P.R.O.). Divine Service Relay. 11.40 to 1.40 p.m., Programme of the General Broadcasting Society (A.V.R.O.). 11.40, a.m., Talk. 12.10 p.m., Kovacs Jajos and his Orchestra. 1.40 to 6.40 Programme of the V.A.R.A. 1.40, Relay of the Labour Party Christmas Programme. 2.40, Records. 2.55, Labour Party Programme (contd.). 4.10, The Station Orchestra, conducted by de Groot: Norwegian Dance (Grieg); Scottische (Wood); Ca c'est Paris (Padilla); Lied und Tanz aus Tirol (Fétras); Neapolitan Serenade (Micheli); Malagueña (Moszkovsky); Russian Dance (Bortkiewicz); Polish Mazurka (Glinka); Bohemian Polka (Hilmar); Czardas (Michiels); Viennese Waltz (Benatzky); Dutch National Dance (Siep). 4.55, For Children. 5.25, Light Music. 5.50, The Adventures of Wakker and Tropicruit. 6.10, The V.A.R.A. Orchestra. 6.40 to 7.40, Programme of the V.P.R.O. Christmas Programme for Children. 7.40 to 11.10, Programme of the A.V.R.O. 7.40, Time and News. 7.45, Talk for the following transmission. 8.0, Relay of the B.B.C. World Broadcast of the Bells of Bethlehem. 8.15, A Nativity Play with Music. 9.30, Bach Recital by Harold Samuel (Pianoforte): Fantasia and Fugue in A minor; Invention in F; Gigue in B flat; Prelude in E; Prelude and Fugue in G sharp minor; Fantasia in C minor. 9.50, The Wireless Orchestra, conducted by Nico Treep. 10.40, News. 10.45, Records of Christmas Carols of all countries. 11.10 till Close Down, Programme of the V.P.R.O. Christmas Programme.

HORBY.—See Stockholm.

HUIZEN

160 kc/s, 1,875 metres; 7 kW. until 3.40 p.m. Transmitted from Kootwijk on 50 kW. from

3.40 p.m.—8.10 to 9.10 a.m., Programme of the Christian Radio Society (N.C.R.V.). 8.10, Divine Service. 9.10 a.m. to 4.40 p.m., Programme of the Catholic Radio Society (K.R.O.). 9.10 a.m., Records. 10.10, High Mass, relayed from the Vrouwekerk, Amsterdam. 11.25, Records. 11.40, The K.R.O. Orchestra, conducted by van 't Woud: Selection from Sigurd Jorsalfar (Grieg); Overture, Rund um die Liebe (O. Strauss); Selection from The Bartered Bride (Smetana); Waltzes, Op. 54, Nos. 1 and 4 (Dvorak); Moment musical (Schubert); Two Slav Dances (Dvorak). 12.25 p.m., Records. 12.40, Talk on Japan. 1.0, The K.R.O. Orchestra (contd.): Unter dem Doppel-Adler (J. F. Wagner); Valse triste (Sibelius); Selection from Ritter Paszmann (Strauss); Overture, Poet and Peasant (Suppé). 1.40, Records. 1.50, Talk: The Restoration of a Benedictine Abbey. 2.10, Sacred Music, Christmas Carols and Records. 3.10, Vocal and Instrumental Music. 3.30, Records. 3.40, For Women. 3.55, Vocal and Instrumental Music (contd.). 4.10, For Invalids. 4.40 to 7.25, N.C.R.V. Programme. 4.40, Divine Service, relayed from the Westkerk, Deventer. 6.10, Christmas Carols by Mlle. Annie Geest (Soprano) and Rie Schallma (Contralto). 7.10, Records. 7.25 till Close Down, K.R.O. Programme. 7.25, Football Results. 7.30, Talk. 7.55, News. 8.0, Relay of the B.B.C. World Broadcast of the Bells of Bethlehem. 8.15, Christmas Concert by the K.R.O. Choir and Orchestra, conducted by Vermeulen, the Bois-le-Duc Musical Society, conducted by Werts, and Soloists: Mme. Immink (Contralto), Van den Berk (Tenor) and Bode (Baritone): Extracts from the Christmas Oratorio (Bach): Carols: (a) Inno Pontificio, (b) Rex Clementissime, (c) Daar is een roos ontloken, (d) O, hoe heerlijk, (e) Benedicta tu, (f) Adeste fideles, (g) De Herdertjes, (h) Drie Koningen zagen een Steer, (i) Stille Nacht, Die heilige Nacht (Gade). 10.10, News. 10.15, Records. 10.20, Epilogue by the Small K.R.O. Choir: Glory to God in the Highest. 10.40, Peace on Earth and Goodwill towards Men. Programme of Carols of all Nations.

INNSBRUCK.—See Vienna.

JUAN LES PINS

1,205 kc/s, 249 metres; 0.8 kW.—8.0, Amusement Guide and Sports Notes. 9.0, News. 9.15, Radio Concert. 10.0, Request Concert. 10.30 till Close Down, Programme in English by the I.B.C. 10.30, Military Band Concert: Gaiety Echoes: El Amabico (Javaloyes); The Parade of the Tin Soldiers (Jessel); Selection from La Source (Delibes); Fire Star (Carter); Carry On (Dundas); Le Réve Passe (Krier). 11.0, Instrumental Concert. 11.30, Light Orchestral Concert: Stardust (Carmichael); Selection from Mother of Pearl (O. Strauss); Song, You Are My Heart's Delight (Lehar); Grammy's Photo Album (Greer); Just Once for all Time (Heymann); Song, At Dawning (Cadman); Jollification (Reeves). 12 Midnight, Dance Music: I Called to Say Good-night; What a Perfect Combination; Put a Little Springtime in the Winter of their Lives; I Can't Remember; The Old Spinning Wheel; It's Within Your Power; Isn't it Romantic; Love is the Sweetest Thing; Sweetheart; Sittin' in the Dark; Harlem Fuss; Waltzing in a Dream; Hold me; I'll see you in the Morning; Let's Put Out the Lights; Let's all Dance the Polka. 1.0 a.m. (Monday) (approx.), I.B.C. Good-night Melody and Close Down.

KALUNDBORG.—See Copenhagen.

KIEL.—See Hamburg.

KLAGENFURT.—See Vienna.

KOSICE.—See Prague.

LANGENBERG

635 kc/s, 473 metres; 60 kW.—9.45 a.m., Gramophone Records. 10.20, Talk: Reminiscences of a Westphalian. 10.30, See Leipzig. 11.0, See Frankfurt. 12 Noon, See Stuttgart. 12.15 p.m., The Kammer-Quintett. 1.0 to 2.30, See Frankfurt. 2.30, Song and Pianoforte Recital. 3.30, Christkinds Erdenreise—Children's Opera in Four Scenes (Gustav Kneip). 4.45, Der Weihnachtsbettler—A Sequence of Poems (Waldeck). 5.0, German Bells on the Rhine. 5.15 to 6.10 p.m., See Frankfurt. 6.15, See Breslau. 7.0, Concert of Old Music. The Station Chamber Quintet and Soloists. 8.0, Christmas Address by Hitler's Deputy, Rudolf Hess. 8.15, See Leipzig. 9.15, See Stuttgart. 9.30 (approx.), See Frankfurt. 10.15 to 11.0, See Stuttgart. 11.0, Christmas Mass from a Church in Kahlenpott.

LAUSANNE.—See Radio-Suisse Romande.

LEIPZIG

770 kc/s, 389.6 metres; 120 kW. Relayd by Dresden, 941 kc/s, 319 metres.—10.15 a.m., Talk on the following transmission. 10.30, Gelobet seist du, Jesu Christ, dass du Mensch geboren bist—Cantata (Bach), by the Municipal and Gewandhaus Orchestra, the Choir of St. Thomas and Soloists. 11.0, See Munich. 12.30 p.m., Old and New Christmas Carols. 1.25, Christmas Reading. 1.35

(approx.), Reading. 1.55, Carols sung by Children. 2.10, Das Spiel von den heiligen drei Königen (Felix Timmermans). 3.0, See Breslau. 4.45, News. 5.0, Talk: The Origin of the Carol Stille Nacht, heilige Nacht. 5.45, Records of the Leipzig Trumpet Ensemble. 6.15, See Breslau. 7.0, Organ Recital. 7.25, See Munich. 8.0, Christmas Address by Hitler's Deputy, Rudolf Hess. 8.15, Thirty German Cathedrals ring in Christmas. 9.15, Die Weihnachtsbotschaft—Christmas Cantata for Four-Part Mixed Choir, Soloist, Strings and Organ (Hermann Simon). 9.45, Records of Organ Music. 10.5, See Munich. 11.0, Catholic Service from the Dresden Hofkirche.

LINZ.—See Vienna.

LJUBLJANA

522 kc/s, 574.7 metres; 7 kW.—9.30 a.m., Orchestral Concert, with Songs. 10.15, Concert of Yugoslav Music. 11.0, Weather, News. 3.30 p.m., Songs by Octet. 4.30, Records. 5.0, Chimes. 5.15, Christmas Number for Children. 5.40, Christmas Concert by the Station Orchestra. 7.0, Talk on Christmas. 7.30, Concert. 8.0, Chimes, relayed from Bethlehem. 8.15, Christmas Carols. 9.0, Recitations. 9.30, Guitar Solos. 10.0, Records. 11.0, Divine Service Relay.

LUXEMBOURG

252 kc/s, 1,191 metres; 200 kW.—8.30 p.m., Concert by the Station Orchestra, conducted by Henri Pénis: Overture, Hamlet (Tchajkovsky); Dance No. 6 (Dvorak). 8.50, News in French. 9.0, Operetta Music by the Station Orchestra, conducted by Pénis: Selection from a Waltz Dream (Oscar Strauss); Selection from Frederica (Lehár); and Die Fiedermas (Joh. Strauss). 9.30, English Dance Music. 9.45, News in German. 9.55, Concert by the Station Orchestra, conducted by Pénis: Overture, Prince Igor (Borodin); Selection from Der Geist des Woewooden (Grossmann); Suite, Goliardica (Armandola); Rhapsody in Blue (Gershwin); Serenade (Moszkovsky); Kaiserwalzer (Joh. Strauss). 11.0, Christmas Concert by the Station Orchestra, conducted by Pénis. Soloist: Gustave Simon (Songs).

MADRID

ARANJUEZ (EAO); 10,000 kc/s, 30 metres; 20 kW.—10.30 p.m., See Madrid (EAJ7). After the Relay, Radio Chronicle. 12.0 Midnight till Close Down, Programme arranged by the International Broadcasting Company. 12.0 Midnight, Dance Music: Signature Tune, Come Back to Erin; My Lucky Day (Davies); Let him live (Kahal); Headin' for a Weddin' (Adamson); Isn't it heavenly? (Meyer); Stay out of my Dreams (Petkere); Somebody stole my Gal (Wood); Sweet Savannah Sue (Brooks); Hurricane Harry (Steiniger); Signature Tune, Come back to Erin. 12.30 a.m., Concert of Light Music: Scotch Hot (Whitlock); Potpourri of Haydn Wood's Songs; Black-eyed Susan Brown (Hoffmann); Selection from The Vagabond King (Friml); The Siege of Monte Carlo (Heymann); Richard of Taunton Deane (arr. Molloy); I Bring a Song (Young). 1.0, I.B.C. Goodnight Melody and Close Down.

MADRID

EAJ7, 707 kc/s, 424.3 metres; 2 kW.—7.0 p.m., Chimes, and Announcements. 7.5 (approx.), Christmas Carols of the Nations, followed by Dance Music. 9.0, Relay of the B.B.C. Transmission from Bethlehem. 1.0 a.m. (Monday) till Close Down, Programme in English by the I.B.C. 1.0, Dance Music: Let the World go drifting by; At the Old Pig and Whistle; Nobody's Sweetheart; Reflections in the Water; Let's call it a Day; We belong Together; If you'll say Yes, Cherie; The Gold Digger's Song; Hold me; Remember my Forgotten Man; Shadow Waltz; We went strolling round the Town; I'll take an option on you; Sweet Dreams; Pretty Lady; Sing another Line; Sundown in a Little Green Hollow. 2.0, I.B.C. Good-night Melody and Close Down.

MALMO.—See Stockholm.

MILAN.—See Turin.

MORAVSKA-OSTRAVA

1,137 kc/s, 263.8 metres; 11 kW.—8.0 a.m., Religious Address. 8.15, See Prague. 10.0, See Brno. 11.0, See Prague. 2.30 p.m., See Prague. 6.30, See Prague. 8.15, See Bratislava. 8.40, See Brno. 9.5, See Prague.

MOSCOW

KOMINTERN.—RW1, 202.5 kc/s, 1,481 metres; 500 kW.—8.0 a.m., Orchestral and Choral Concert. 8.55, Time. 9.0, News. 9.15, Literary Programme for Collective Farm Workers. 10.15, Request Orchestral and Choral Concert. 1.45 p.m., Announcements. 2.15, For Children. 2.55, Time. 3.0, News. 3.15, Talk. 3.30, Talk: The Communist Party. 4.30, Red Army Programme. 5.30, Programme for Collective Farm Workers. 6.30, Talk on Aviation and Announcements. 7.0, Vocal Quartet and Wind Instrument Orchestra. 8.0, Talk in German: Christmas Eve without a Christmas Tree. 8.55, Chimes from the Red Square. 9.5, Talk in English: The Smiths visit their Parents in Moscow. 10.5, Talk in Swedish: Clubs instead of Churches.

MOTALA.—See Stockholm.

MUHLACKER.—See Stuttgart.

DEC. 24th **SUNDAY** continued

MUNICH

716 kc/s, 419 metres; 60-100 kW. Relayed by Augsburg and Kaiserslautern, 536 kc/s, 560 metres; and Nürnberg, 1,256 kc/s, 239 metres.—9.15 a.m., A Christmas Legend. 10.15 to 11.0. See Leipzig. 11.0, Orchestral Concert. 12.30 p.m., See Berlin (Deutschlandsender). 1.0, Time, Weather, Announcements. 1.10 (from Nürnberg), Agricultural Talk. 1.30, Christmas Music on Records. 2.30, Ihr Kindelein, kommet—A Nativity Play (Emma Hennies and Lydia Neisser); Music by Fuchs. 3.0, See Breslau. 4.45, See Leipzig. 5.0, Songs of the Alps— for Choir and Orchestra. 5.20, The Star in the East—Three Scenes (Lipp). 6.15 to 7.25, See Breslau. 7.25, The One Hundred and Twelfth Psalm (for Soprano, Mixed Choir, and Orchestra (Handel)). 8.0, Christmas Address by Hitler's Deputy, Rudolf Hess. 8.15, See Leipzig. 9.15, Favourite Christmas Carols of Seventeen Countries. 10.5, Heilige Nacht—a Christmas Legend (Ludwig Thoma). 11.0, See Leipzig.

NAPLES.—See Rome.

NOTODDEN.—See Oslo.

OSLO

277 kc/s, 1,083 metres; 60 kW. Relayed by Fredriksstad, 815 kc/s, 368.1 metres; Hamar, 522 kc/s, 574.7 metres; Notodden, 671 kc/s, 447.1 metres; Porsgrund, 662 kc/s, 453.1 metres; Rjukan, 671 kc/s, 447.1 metres; and Jotøy, LCL, 6,990 kc/s, 42.92 metres.—9.15 a.m., News. 9.20, Chimes and Divine Service, relayed from the Cathedral, Stavanger. 3.0 p.m., For Children. 4.0, Organ Recital, relayed from the Church, Sandefjord. 4.30, Reading of Christmas Stories. 5.0, Christmas Programme; The Station Orchestra, a Choir and Soloist; Solveig Borthen (Contralto), Orator and Orchestra; A Christmas Prologue (Rolf Hjørth Schøyen), with Music by Per Reidarson; Christmas Motet for Contralto, Choir and Organ (Alnaes); Piano-forte Quintet, Largo (Handel); Ave verum (Mozart); Contralto Solo, Christmas Carol; Christmas Scene (Humperdinck); Choir and Orchestra, Christmas Eve (Per Reidarson); Solveig's Song (Grieg); Christmas Carol. 6.30, A Christmas Eve Visit with the Microphone to a Police-Station, Railway Stations, and a Fire Station. 7.0, Time. 8.0, Relay of the B.B.C. World Broadcast of the Bells of Bethlehem. 8.15 (approx.), Close Down.

OSTERSUND.—See Stockholm.

PALERMO

556 kc/s, 539.5 metres; 3 kW.—12 Noon to 1.0 p.m., Light Music. In the interval, Time, News and Weather. 4.30 to 5.30, Gramophone Records. 7.0, News and Giornale Radio. 7.20, Records. In the in-

terval, Sport Notes, Time and Announcements. 7.45, Sacred Music. In the interval, Talk and Announcements. 10.0, Giornale Radio.

PARIS

EIFFEL TOWER, Call FLE, 207.5 kc/s, 1,445.7 metres; 13 kW. Time Signals (on 2,650 metres) at 9.26 a.m. and 10.26 p.m. (Preliminary and 6-dot Signals).—12.30 p.m., Dance Music by the Meelingor Band. 1.0, News. 1.15, Dance Music (contd.). 5.45, Le Journal Parlé. 7.15, Weather. 7.25, News. 7.30, Records; Part I: Christmas Music; Part II: Variety Music.

PARIS

POSTE PARISIEN, 914 kc/s, 328.2 metres; 60 kW.—10.0 a.m., Gramophone Music: Joyeux Noël; Silent Night. 10.7, Talk. 10.10, Press Review. 10.30, Records. 11.0, Gramophone Concert. 11.30, Popular Concert. 12.15 p.m., Extracts from Sound Films. 12.45, Sponsored Programme. 12.50, Half an hour of Fantasy by Paul Weill. 1.25, Recitations by André Gaudette. 1.30, Records. 6.15 to 6.45, Programme in English by the I.B.C.; Special Christmas Eve Broadcast of Christmas Carols. 7.0, Le Journal Parlé. 7.5, Sports Notes. 7.15, Le voyage du père—Radio Sketch for Children (Raymond Cognat). 8.20, Carols on Gramophone Records. 8.30, Recitations. 9.20, Christmas Stories (Maurice Bouchor), with Music by the Station Orchestra and Choirs. 10.0, Christmas Carols. 10.35, Concert of Christmas Music. 11.0, Relay from Bethlehem. 11.15, Records. 11.25, Dance Music on Records.

PARIS

RADIO PARIS, Call CFR, 174 kc/s, 1,725 metres; 75 kW.—12.20 p.m., Sacred Music. 12.30, Bilboquet Programme. 12.45, Records. 1.0, Concert. 2.30, White Horse Inn—Operetta (Stolz-Benatzky), relayed from the Mogador Theatre. 7.0, Jazz Music by The Cadets, conducted by Nys. 8.0, Dramatic and Musical Programme. In the intervals, News. 12 Midnight, Dance Music.

PITTSBURGH

KDKA; 980 kc/s, 306 metres; 50 kW. Relayed by W8XK on 48.86 metres and 25.27 metres—2.0 p.m., Children's Hour, from New York. 3.0, Southland Sketches, from New York. 3.30, Samovar Serenade, from New York. 4.0, First U.P. Church. 5.15, Baby Rose Marie, from New York. 5.30, Radio City Concert, from New York. 6.30, Old

Songs of the Church. 6.45, Sunday Favourites. 7.0, Bar-X Ranch, from New York. 7.30, Grenadier Guards Band, from New York. 8.0, International Tit-bits, from New York. 8.30, Variety Programme, from New York. 9.0, Railroad Adventures, from New York. 9.15, Egizi's Salon Orchestra. 9.30, Vesper Services. 10.30, Grand Hotel, from New York. 11.0, Symphony Programme, from New York.

PORSGRUND.—See Oslo.

PRAGUE

614 kc/s, 488.6 metres; 120 kW. 9.45 a.m., Harp Solos. 10.0, See Brno. 11.0, Chimes and News. 11.15, Orchestral Concert, conducted by Jan Pesta. 12 Noon, Christmas Carols. 12.30 p.m., Talk on Agriculture. 1.0 to 1.15, Announcements. 2.20, Programme for Children. 3.0, Sacred Christmas Music. 3.15, Records. 3.30, Reading. 3.45, Records. 4.0 to 4.30, German Transmission: Review of the Music Broadcasts and Recital of German Carols. 6.30, Christmas Programme. 7.15, Carillon Recital. 8.0, Relay of the B.B.C. Transmission from Bethlehem. 8.15, See Bratislava. 8.40, See Brno. 9.5, Recitations. 9.20, Christmas Mass. 10.15, Organ Recital by Alois Michl, relayed from the St. Salvator Church. 10.55, Christmas Chimes. 11.0, Gregorian Mass, relayed from the Abbey of Emauzy. 12.30 a.m. (Monday), Close Down.

RADIO-SUISSE ROMANDE

SOTTENS, 743 kc/s, 403 metres; 25 kW., and Geneva, 395 kc/s, 760 metres.—10.0 a.m. (from Geneva), Records. 11.30, News and Weather. 11.40 (from Geneva), Records. 1.0 to 2.0 p.m., Interval. 2.0, The Radio Suisse Romande Orchestra, conducted by Echenard. 3.0, Records. 3.30, The Radio Suisse Romande Orchestra (contd.). 4.0 to 5.0, Interval. 5.0 (from Geneva), Records. 5.30 (from Geneva), Christmas Readings. 6.0 (from Geneva), Catholic Address. 6.30 (from Geneva), Radio Chronicle. 7.0 (from Geneva), Christmas Legends of Tessin. 7.20, Christmas Concert by the Radio Suisse Romande Orchestra, conducted by Ansermet. 8.0, Relay of the B.B.C. World Broadcast of the Bells of Bethlehem. 8.20, Christmas Concert (contd.). 9.15, News, Weather. 9.25 (from Geneva), Christmas Tales. 9.50 (from Geneva), Good-will to all men—Christmas Programme for all European Countries (on Records). 10.30

(from Geneva), The Story of the Birth of Christ. 10.45 (from Geneva), Midnight Mass, relayed from St. Joseph's Church.

RIGA

571 kc/s, 525.3 metres; 15 kW.—7.30 a.m., Sacred Music. 9.0, Divine Service. 11.0, Weather. 11.30, Agricultural Talk. 12 Noon, For Children. 1.0 p.m., Talk: The American Indians. 1.30, Records: Overture. Preciosa (Weber); Overture (Meyerbeer); Prelude and Arias from Lohengrin (Wagner); Selection from Tieland (d'Albert); Overture, Alessandro Stradella (Flofow). 2.15, French Lesson. 2.45, Christmas Concert for Children. 4.0, Divine Service from the Cathedral. 5.15, Reading (Selma Lagerlöf). 5.45, News. 6.0, Christmas Concert, conducted by Parups: Two Carols for Choir; Address; Three Carols for Choirs; Hunting Horn; (a) Carol (Pech). (b) Motet (Brant). (c) Song (Mozart). (d) Heilige Nacht (Beethoven); Songs for Choir; Air (Bach-Reger); Meditation (Bach-Gounod); The Heavens are telling (Beethoven); Two Viola Solos; Prayer (Grieg); Biblical Pictures (Reinecke). In the interval, Weather. 8.0, Relay of the B.B.C. World Broadcast of the Bells of Bethlehem. 8.15, Concert (contd.). Ave Maria (Kahn); Piece (Hanekam). 8.30, Relay of Foreign Stations. 9.0, Catholic Service.

RJUKAN.—See Oslo.

ROME

Call 1R0, 680 kc/s, 441 metres; 50 kW. Relayed by Naples, 941 kc/s, 319 metres; Milan (Vigentino), 662 kc/s, 453.1 metres, from 7.40 p.m.; and 2R0, 11,810 kc/s, 25.4 metres.—10.0 to 11.0 a.m., See Turin. 11.30, Records. 11.45 to 1.15 p.m., See Turin. 2.45 (Naples), Programme for Children, Weather. Sports. 3.0, Concert for Mother's and Children's Day. 3.30, Records and Sports. 4.0, Chamber Music. 5.30, Weather. 6.30, News. 7.0, Time, Announcements, and Records. 7.5, Soprano and Baritone Solos. 7.30, Sports Notes. 7.40, Christmas Concert. 10.0, Giornale Radio. 11.0, Midnight Mass.

SALZBURG.—See Vienna.

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by W2XAF on 31.48 metres and by W2XAD on 19.56 metres.—7.0 p.m., Gene Arnold and the Commodores, from New York. 7.30, Looking over the Week, by John B. Kennedy, from New York. 7.45, Gems of Melody, from New York. 8.0, Wayne King's Orchestra, from New York. 8.30, Musical Programme, from New York.

SCHWEIZERISCHER

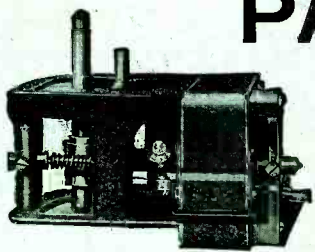
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DEC. 24th **SUNDAY** continued

Berne, 1,220 kc/s, 245.9 metres.—9.45 a.m. (from Basle), Concert of Salvation Army Music. 10.30 (from Basle), Reading from the Works of Swiss Authors. 11.0 (from Basle), Records. 11.30, Time and News. 11.40 (from Zürich), The Beromünster Orchestra. 12.30 p.m. (from Basle), Agricultural Talk. 1.0 to 1.30 (from Basle), The Basle Zither Quartet. 3.0 (from Basle), For Children. 4.0 (from Zürich), The Beromünster Orchestra. 4.40 (from Basle), Two Plays. 5.40 (from Zürich), The Beromünster Orchestra. 6.0, Time and Weather. 6.5 (from Basle), Records. 6.30 (from Basle), Talk on Christmas Eve. 7.0, News. 7.10 (from Basle), Christmas Music on Records. 8.0, Relay of the B.B.C. World Broadcast of the Bells of Bethlehem. 8.15 to 9.30 (from Basle), Christmas Festival relayed from a Church. 11.0 (from Basle), Midnight Mass relayed from St. Joseph's Church.

SOTTENS.—See Radio-Suisse Romande.

STOCKHOLM

689 kc/s, 436 metres; 55 kW. Relayed by Boden, 242 kc/s, 1,239.5 metres; Göteborg, 932 kc/s, 322 metres; Hörby, 1,167 kc/s, 257 metres; Motala, 222.5 kc/s, 1,347 metres; Östersund, 402 kc/s, 746.2 metres; and Sundsvall, 554 kc/s, 542 metres.—1.0 p.m., Christmas Programme by Calle Möller. 1.50, Talk: Christmas in Rome. 2.15, Recital of Swedish Christmas Carols by Nils Svanfeldt. 2.55, For Children. 3.0, A Nativity Play, with Music (Hermann). 4.5, Divine Service, relayed from the Uppsala Cathedral. 5.15, Records. 6.15, Weather, News. 6.25, Programme of Christmas Dances. 7.30, Christmas Music by the Radio Choir, The Septiman String Ensemble, Edit Widmark-Lundblad (Songs) and Oscar Tjernberg (Songs). 8.0, Relay of the B.B.C. World Broadcast of the Bells of Bethlehem. 8.15, Christmas Music (cont'd.). 8.45, Weather. 8.50, Records.

STRASBOURG

369 kc/s, 345 metres; 11.5 kW.—11.0 a.m., Gramophone Concert: Christmas Music. 11.30, Catholic Service in German. 12 Noon, Gramophone Concert. 12.45 p.m., News. 1.0, Time Signal. 1.1, Gramophone Concert. 2.0, Agricultural Talk in German. 3.0, Symphony Concert, relayed from the Conservatoire, Paris. 5.0, Christmas Carols on Gramophone Records. 6.0, Medical Talk. 6.15, Sports Talk. 6.30, Orchestral Concert, conducted by Roskam. 7.30, Time Signal. 7.31, News. 7.45, Gramophone Music. 8.0, News in German. 8.30, Chamber Music Concert: Soloist: Georges Petit (Songs). In the interval, Press Review. 10.45, Christmas Eve Service, relayed from a Protestant Church. 11.45, Chimes, Te Deum and Midnight Mass from Strasbourg Cathedral. 1.0 a.m. (Sunday), Close Down.

STUTTGART

MUHLACKER, 563 kc/s, 533 metres; 100 kW. Relayed by Freiburg, 1,157 kc/s, 259.3 metres, and 527 kc/s, 570 metres (until January 16, 1934)—8.0 a.m., Sacred Music. 8.30, Children's Service. 9.15, See Frankfurt. 9.35, Records. 10.30, See Leipzig. 11.0, See Frankfurt. 12 Noon, Topical Talk. 12.15 p.m., With the Microphone at the Canary Show. 12.30, New Records. 1.0 to 2.30, See Frankfurt. 2.30 to 5.15, See Langenberg. 5.15 to 6.15, See Frankfurt. 6.15, See Breslau. 7.0, See Langenberg. 8.0, Christmas Address by Hitler's Deputy, Rudolf Hess. 8.15, See Leipzig. 9.15, Junggesellenweihnacht—Radio Scene (Paul Enderling). 9.25, See Frankfurt. 10.15, The New Radio Set—a Sketch (Curt Elwenspoek). 10.30, Records of Christmas Music. 11.0, See Langenberg.

SUNDSVALL.—See Stockholm.

TOULOUSE

RADIOPHONIE DU MIDI, 779 kc/s, 382 metres; 8 kW.—11.0 a.m., Dance Music. 11.30, Military Music. 11.45, Light Music. 12 Noon, Orchestral Music. 12.15 p.m., Operetta Music. 12.30, Catholic Service. 12.45, Concert by a Viennese Orchestra. 1.0, Market Prices and Time. 1.5, Music from Sound Films. 1.30, Orchestral Music. 1.45, Protestant Service. 2.0, Operetta Music. 2.15, Agricultural Notes. 2.30, Light Music. 2.45, Chansonnettes. 3.0, Symphony No. 3—The Eroica (Beethoven), by the Augmented Symphony Orchestra. 4.0, Military Music. 4.15, Accordion Music. 4.30, Russian Songs. 4.45, Music by an Argentine Band. 5.0, Dance Music. 5.45, Operetta Music. 6.0, News. 6.15, Opera Music. 6.30, Light Music. 6.45, Orchestral Music. 7.0, Orchestral Music. 7.15, News. 7.30, Ballet Music from Sylvia (Delibes) by the Symphony Orchestra. 7.45, Opera Music. 8.0, Organ Solos. 8.30, Sacred Music. 8.45, Music by a Viennese Orchestra. 9.0, Concert Version of Un soir de reveillon—Operetta (Moretti). 9.40, Christmas Music. 9.45, Operetta Music. 10.0, Hunting Horn Music. 10.15, News. 10.30, Concert for Listeners in Morocco. 11.0, Music from Sound Films. 11.15, Orchestral Music. 11.30, Chansonnettes. 11.45, Spanish Dance Music. 12 Midnight, News. 12.5 a.m. (Monday), Choral Concert of Sacred Songs. 12.30, Concert. 2.0 (approx.), Close Down.

TRIESTE

1,211 kc/s, 247.7 metres; 10 kW.—8.40 a.m., See Turin. 8.55, Mass from the Cathedral of San Giusto. 9.40, See Turin. 10.0, Religious Address. 10.20, Agricultural Talk. 11.0 till Close Down, See Turin.

TRONDHEIM.—See Oslo.

TURIN

1,096 kc/s, 273.7 metres; 7 kW. Relayed by Milan, 903 kc/s, 332.2 metres; Genoa, 959 kc/s, 312.8 metres; and Florence, 598 kc/s, 501.6 metres.—8.40 a.m., Giornale Radio. 9.40, Agricultural Talk. 10.0, Mass from the Church of the Annunciation, Florence. 11.0, Bible Reading. 11.30, Records. 11.45, Orchestral Concert, conducted by Titro Petralia. 12 Noon, Time and News. 12.45 p.m., Records. 2.30, Records and Sports Notes. 2.45, Choral Concert. 4.0, Concert for Mothers' and Children's Day. In the intervals, Sports Reports. 5.0, Sports Review. 5.15, Weather. 6.0, Time, Announcements. 6.15, Records. 6.50, Announcements and Records. 7.40, The Christmas Carol—Musical Play (Nelly Nelson). 8.0, Christmas Concert, conducted by Ugo Tansini. Soloist: Ulisse Matthey (Organ). Choir Master: Ottorino Vertova. Concerto grosso No. 8 for Organ and Orchestra (Corelli). Organ Solo: Prelude and Pastorale (Pasquini); Soprano Solo with Organ: Carol (Daquin); Gloria in excelsis Deo, for Choir, Orchestra (Parelli). Talk. Pastorale (Jachino); Cello Solo. Aria (Porpora); Extracts from L'enfance du Christ (Berlioz). Organ Solos (Guilmant): (a) Pastorale, (b) Piece. Announcements. 9.30 (approx.), The Birth of Jesus (Vitali), for Soloists, Choir and Orchestra. 10.0, Giornale Radio. 10.5, Christmas Carols. 11.0, Midnight Mass from the Chiesa dell' Ara Coeli.

VIENNA

580 kc/s, 517.2 metres; 100 kW. Relayed by Graz, 852 kc/s, 352.1 metres; Innsbruck, 1,058 kc/s, 283 metres; Klagenfurt, 662 kc/s, 453.1 metres; Linz, 1,220 kc/s, 245.9 metres, and Salzburg, 1,373 kc/s, 218.5 metres.—7.0 a.m., Announcements. 7.5, Gramophone Concert: Four Pieces (Grieg): (a) Morning, (b) The Death of Ase, (c) Anitra's Dance, (d) In the Hall of the Mountain King; AR-Wien

(Schubert - Friedman); Caprice viennois (Kreisler); Waltz, Die Schönbrunner (Lanner); Melody (Denza); Potpourri, So schön, wie's einmal war (Dauber); Fantasia, Fortissimo (Kálmán); Waltz, The Blue Danube (Joh. Strauss-Schulz-Evler). 8.20, Gym. 8.40, Weekly Review. 9.0, Organ and Soprano Song Recital by Franz Schutz and Louise Hellestgruber. 9.30, Reading (Ruth Schanmann). 9.50, Pianoforte Recital by Emmy Köpf. 10.20, Religious Programme. 11.0, Concert by the Wiener Symphoniker, conducted by Max Schönherr. Soloists: Lenz and Scheimbauer (Duets). 1.50 p.m., Time and Announcements. 2.0, Kay and Gerda—Children's Play (Hulda Mical). After the Programme, Distribution of Christmas Prizes. 3.30, Recital of Advent Hymns and Christmas Carols by the Schola Gregoriana, conducted by Franz Kesch, with Introductory Talk. 4.0, Concert. 5.0, Talk. 5.30, Recital by the Stiegler Quartet. 6.0, Time and Announcements. 6.10, Misa, Puer natus est (Springer) by an Orchestra. 7.20, Recitation. 7.50, Address by the Archbishop of Vienna, Dr. Theodor Innitzer. 8.0, Christmas in Bethlehem—Programme relayed from Bethlehem. 8.15, Gramophone Concert of Christmas Music. 9.0, News. 9.15, The Station Orchestra, conducted by Max Schönherr. 10.50, Midnight Mass, relayed from St. Stephen's Cathedral. After the Programme, Announcements.

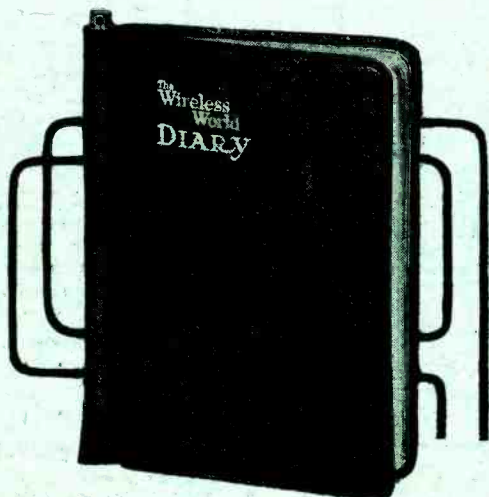
WARSAW

212.5 kc/s, 1,411 metres; 120 kW.—9.0 a.m., Divine Service and Sacred Music on Gramophone Records, relayed from Lwów, 788 kc/s, 381 metres.—10.57 a.m., Time Signal and Fanfare from St. Mary's Church, Cracow. 11.5, Announcements. 11.10, Weather. 11.15, Joh. Strauss and Liszt Concert by the Philharmonic Orchestra. During the interval, Talk. 1.0 p.m., Dramatic Programme. 1.30, Popular Music (on Gramophone Records). During the interval, News. 2.0, Talk: Village Festivals. 2.20, Concert by the Station Orchestra. 3.0, For Children. 3.30, Records of Jan Kiepura. 3.45, Reading. 4.0, Talk: The Birth of a New World. 4.15, Christmas Carols, relayed from Cracow. 5.0, Programme relayed from Lwów, 788 kc/s, 381 metres. 5.40, Song Recital. 6.0, Announcements. 6.5, News. 6.30, Review of the Week's Events for Young People. 6.45, Art Notes. 6.50, Light Music by the Station Symphony Orchestra. 7.50, Radio Journal. 8.0, Topical Talk. 8.15, Concert (cont'd.). 9.0, Humorous Programme from Lwów. 10.0, News. 10.5, Records. 11.0, Midnight Mass, relayed from Wilno.

ZÜRICH.—See Schweizerischer Landessender.

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DEC. 25th

MONDAY

continued

by Adolf Secker. Overture, Euryanthe (Weber); Turkish March (Mozart); Welland Suite (Knutmann); Berceuse (Sgambati); Serenade from Don Juan's letztes Abenteuer (Graener); Ballet Music, from Lakmé (Delibes); Romance (Tcherepin); Sevillana (Niemann); Waltz, Destiny (Baynes); Selection from Paganini (Lehár); Waltz, The Wedding of the Winds (Hall); Three Russian Sketches (Dreyer); March, Entry of the Gladiators (Fueck); In the interval, News, Weather. 1.0 p.m., Poetry Reading. 1.20. See Berlin (Funkstunde). 2.0, Maria durch die Heide geht—a North German Nativity Play (Wilhelm Winkel). 3.0, See Heilsberg. 4.20, Christmas Oratorio—Op. 23 (Kurt von Wolfurt). 5.50, Weather. 6.0, Transmission for all German Stations, relayed from Berlin (Funkstunde). 7.5, Opera and Operetta Concert by the Philharmonic Orchestra, conducted by Richard Richter. Soloist: Carl Günther (Songs). Overture, The Merry Wives of Windsor (Nicolaï); Aria from La dame blanche (Boieldien); Hymn from Alessandro Stradella (Plotow); Selection from The Barber of Seville (Rossini); Prelude to the Third Act, Dance of the Apprentices and Greeting to Hans Sachs from The Mastersingers (Wagner); Strauss Operetta Potpourri Music (Schögel); Selection, from The Arabian Nights (Joh. Strauss); Lehár Potpourri, Rendez-vous bei Lehár (Hruby). 9.0, News. 9.30, Dance Music.

HANOVER.—See Hamburg.

HEILSBURG

1.085 kc/s, 276.5 metres; 60 kW. Relayed by Danzig, 671 kc/s, 447.1 metres.—10.30 a.m., See Leipzig. 11.0, Concert by the Königsberg Opera House Orchestra, conducted by Wolfgang Brückner. Overture, Oberon (Weber); Selection from The Mastersingers (Wagner); Symphonic Poem, Sárka (Smetana); Waltz, Tales from the Vienna Woods (Joh. Strauss); Ballet Music from Sylvia (Delibes); Hungarian Rhapsody No. 2 (Liszt); Selection from Die Puppefee (Bayer); Overture, Die schöne Galathee (Suppé). 1.0 p.m., For Children. 1.20, See Berlin (Funkstunde). 2.0, Talk on the Singer, Thomas Koschat, with Records. 2.35, Reading. 3.0, The Small Station Orchestra, conducted by Eugen Wilcken. Kinderlieder Marsch (Lindemann); Christmas Potpourri (Hartmann); Dance from Peterchens Mondfahrt (Schmalstich); Baby's Spielzeug (Noack); Volkslieder-Walzer (Egg); Frühlingsbotschaft (Fueck); Czardas No. 8 (Michaels); Idylle passionelle (Razigade); Potpourri, Fortissimo (Feigl); Overture, Im Reiche des Indra (Lincke). In the interval, Radio Report. 5.0, (from Danzig), Talk: Hans Sachs in Danzig. 5.25, Christmas Carols. Ich steh an deiner Krippen hier; Geborn ist uns ein Kindelein; Wach, Nachtigall, wach auf; Maria durch ein Dornwald ging; Auf dem Berge da wehet der Wind; Extracts from Das Mittelstück (Timmermanns): (a) Der Heiland ist geboren, (b) Still, still sein, (c) Es kommt ein Schiff geladen, (d) Bist einmal gekommen, (e) Freude. 6.0, Transmission for all German Stations, relayed from Berlin (Funkstunde). 7.5 to 9.0, See Hamburg. 9.0, News. 9.30 to 12 Midnight, See Hamburg.

HILVERSUM

1.013 kc/s, 296.1 metres; 7 kW. up to 5.40 p.m. and 20 kW. from 5.40 p.m. Programme of the Workers' Radio Society (V.A.R.A.).—8.40 a.m., Records. 9.40 to 11.40, V.P.R.O. Programme. 9.40, Divine Service. 10.55, Records. 11.40, The Rotterdam Philharmonic Orchestra, conducted by Flipse, and the Apollo Male Voice Choir. 1.40 to 4.40 p.m., Programme of the General Broadcasting Society (A.V.R.O.). 1.40, Time. 1.41, Sacred Concert by Piet van Edmond (Organ); To van der Snyts (Soprano) and Annie Woud (Contralto). 2.25, Reading. 2.55, Violin Sonatas by Andries Roodenburg: Sonata in G (Beethoven); Sonata in A Minor (Schumann). 3.25, Christmas Carols by the Wireless Children's Choir, relayed from the Concertgebouw, Amsterdam. 3.55, Records. 4.25, Records of Christmas Music. 4.40 till Close Down, V.A.R.A. Programme. 4.40, The V.A.R.A. Orchestra, conducted by H. de Groot: Overture, Phèdre (Massenet); Selection from Rosamunde (Schubert); Romantic Waltz (Reinecke); Selection from Les millions d'Arlequin (Drigo); Melody (Caylor); Der ideale Christel (Lorenz). 5.25, Recitations. 5.40, The V.A.R.A. Orchestra (cont'd.); Soloist, Jong (Organ); Organ Concerto (Corelli); Andante from the Symphony in B Minor (Bach); Christmas Fantasy (Grit). 6.10, Talk. 6.30, Records. 6.40, Song Recital by a Vocal Ensemble. 7.0, Song and Flute Recital. 7.10, Song Recital by a Vocal Ensemble (cont'd.). 7.25, News. 7.40, The V.A.R.A. Orchestra; Soloists, Mlle. Marie Vos (Soprano) and Aramesco (Tenor); Overture and Duet from The Magic Flute (Mozart); Selection from Cavalleria rusticana (Mascagni); Extracts from La Bohème (Puccini). 8.25, Her worde licht—Radio Play (Heversluis), with Organ Music by Jong, and Records. 8.55, The V.A.R.A. Orchestra (cont'd.): Overture, La belle Hélène (Offenbach); Soprano Songs from Le pont des soupis (Offenbach); Selection from The Tales of Hoffmann

(Offenbach); Tenor and Orchestra, Auftrittslied des Barinskis (Strauss); Duets from The Land of Smiles (Lehár). 9.40, Recitations. 9.55, Variety Concert: Steyn (Organ), Mulder (Saxophone Clarinet), Charmon (Pianoforte and Songs), Hagenaar (Trumpet), Vogel (Pianoforte), and Carlquist (Guitar and Banjo). 10.40, Records.

HORBY.—See Stockholm.

HUIZEN

160 kc/s, 1,875 metres; 7 kW. until 3.40 p.m. Transmitted from Kootwijk on 50 kW. from 3.40 p.m.—7.10 a.m., Religious Programme of the Christian Radio Society (N.C.R.V.). 8.10, Religious Programme of the Catholic Radio Society. 9.10 till Close Down, N.C.R.V. Programme. 9.10, Records. 9.30, Divine Service, relayed from the Nieuwe Westerkerk, Rotterdam. 11.10, Recital of Christmas Carols by Ina Mulder-Belser, with Flute Obligato by Wittpen. 12.10 p.m., Records. 12.40, Organ Recital. 1.40, Carillon Concert, relayed from the Palais Royal, Amsterdam. 2.40, An Instrumental Ensemble and Maartje Offers (Mezzo-Soprano). 4.25, The Apeldoorn Male Voice Choir. 7.55, The Small Station Orchestra, conducted by den Hurk; Jo. Vincent (Soprano), Suzé Luger (Contralto), van Tulder (Tenor) and Willem Ravelli (Bass). In the interval, Recitations. 10.25, News. 10.40, Records.

INNSBRUCK.—See Vienna.

KALUNDBORG.—See Copenhagen.

KIEL.—See Hamburg.

KLAGENFURT.—See Vienna.

KOSICE.—See Prague.

LANGENBERG

635 kc/s, 473 metres; 60 kW.—6.0 a.m., Sacred Concert. 9.0, Catholic Service. 10.0, See Stuttgart. 10.30, See Leipzig. 11.0, See Frankfurt. 12 Noon to 1.20, See Stuttgart. 1.20, See Berlin (Funkstunde). 2.0 to 5.0, See Stuttgart. 5.0 to 6.0, See Frankfurt. 6.0, Transmission for all German Stations, relayed from Berlin (Funkstunde). 7.0, Sports Notes. 7.10 to 9.20, See Frankfurt. 9.20, See Stuttgart. 9.30, News. 9.45 to 1.0 a.m. (Tuesday), See Stuttgart.

LAUSANNE.—See Radio-Suisse Romande.

LEIPZIG

770 kc/s, 389.6 metres; 120 kW.—Relayed by Dresden, 941 kc/s, 319 metres.—9.50 a.m., Christmas Letters by Hebbel, Goethe and Rilke. 10.15, Talk on the following Transmission. 10.30, Selhet, welch' eine Liebe hat uns der Vater erzeiget—Cantata (Bach), by the Municipal and Gewandhaus Orchestra, the Choir of St. Thomas and Soloists. 11.0, See Munich. 12 Noon, See Breslau. 1.0, Reading. 1.20, See Berlin (Funkstunde). 2.0, A Folk Song Trio (Albert Kranz). 2.25, Reading: Christmas in the Great War. 2.45, A Christmas Tale. 3.0, See Munich. 5.0, Talk: Nordic and Germanic Sun Worship. 5.25, Christmas Carols to the Lute, and Readings. 6.0, Transmission for all German Stations, relayed from Berlin (Funkstunde). 7.0, Christelfein—Opera in Two Acts (Pfitzner). 8.30, See Breslau. 9.45, News. 10.5, Sports Notes, Weather. 10.25, The Station Orchestra, conducted by Theodor Blumer. Overture, König Drosselbart (Hanel); Suite, Pictures from the South (Nicodé); Waltz, Loreley-Rheinklänge (Joh. Strauss); Selection from Der Wildschütz (Lortzing); Pianoforte Solos (Grieg): (a) An den Frühling, (b) Erotica; Overture, Der dumme August (Gfaller); Joh. Strauss Waltz Potpourri (E. Strauss); Selection from Das Fürstentum (Lehár); March, Perpetuum mobile (Blond).

LINZ.—See Vienna.

LUXEMBOURG

252 kc/s, 1,191 metres; 200 kW.—12.0 Noon, Concert by the Station Orchestra, conducted by Henri Pénis: Overture, Semiramis (Rossini); Humoresque (Dvorak); Torna a Sorriento (Curtis); Ballet Music from La Source (Delibes); Suite, Le Roi David (Honegger-Salabert); Liebesbrief (Königsberger); March, Heil Europa (von Blon). 1.0 p.m., Gramophone Concert: Invocation (Ganne); Introduction and Allegro for Strings (Elgar); Andante religioso (Thomé); Cello Solo, Elegy, Op. 24 (Fauré); Organ Solo (Bach); La Procession Nocturne (Rabaud); Ballet Music and Hungarian March from The Damnation of Faust (Berlioz); Joyeuse Marche (Chabrier). 5.30, Gregorian Chants and Organ Solos relayed from the Benedictine Abbey at Clervaux. 6.30, Quintet in F minor (Franck) on Gramophone Records, by Alfred Cortot and the International String Quartet. 7.0, Concert by the Station Orchestra, conducted by Pénis: Coriolanus Overture (Beethoven); Flute Concerto in C (Mozart); A Night on the

Bare Mountain (Mussorgsky); Interlude (Vreuls); Chromatic Gallop (Liszt). 8.0, Dance Music. 8.30, Italian Concert by the Station Orchestra, conducted by Pénis; Selection from Sicilian Vespers (Verdi); Brise de mer (Leoncavallo). 8.50, News in French. 9.0, Italian Concert (cont'd.): Selection from The Barber of Seville (Rossini); Caro mio ben (Giordano); Waltz (Carena); Leggenda d'amore (Bece); Selection from Madame Butterfly (Puccini). 9.45, News in German. 9.55, Violin Recital by Theo Ratner: Il Trillo del Diavolo (Tartini); Campanella (Paganini). 10.20, Dance Music on Gramophone Records.

MADRID

ARANJUEZ (EAQ7), 10,000 kc/s, 30 metres; 20 kW.—10.30 p.m., Concert of Light Music. 10.45, Radio Chronicle. 11.0, Programme for Catalonians Abroad. 12.0 Midnight till Close Down, Programme in English by the I.B.C., Ltd. 12.0 Midnight, Concert of Old Favourites: Love's Old Sweet Song (Molloy); Wild-diamond Fair (Jacobi); Swanee (Gershwin); The Sweepers (Elgar); The Blue Danube (Strauss); O dem golden Slippers; Smile, darn ya, smile (Rich); The Rosary (Nevin). 12.30 a.m. (Tuesday), Light Music: Selection from Noel Coward's Cavalcade; Le Réve passe (Krier); 'Tis the Day (Leoncavallo); Learn to Croon (Coslow); Parade of the Minutes (Myers); A Perfect Day (Jacobs-Bond); Two of Irish (Whitlock). 1.0, I.B.C. Goodnight Melody and Close Down.

MADRID

EAJ7, 707 kc/s, 424.3 metres; 2 kW.—2.0 p.m., Chimes, Time, Weather and Announcements. 2.15 (approx.), Concert, Two-Step, Jardines de España (Cañadas); The Dancing Doll (Poldini); Fado das Penas (d'Oliveira); Fantasia; Minuet (Mozart); Selection from The Barber of Seville (Rossini); Tango, Suspiros (Canaro); Drinking song, Don Gil de Alcalá (Penella); Spanish Rhapsody (Albéniz); Brazilian Dance (Milhand); Foxtrot (Berlin); Valse triste (Sibelius); Overture, Fingal's Cave (Mendelssohn). In the interval: Exchange. 3.55, Announcements. 4.0 to 7.0, Interval. 7.0, Chimes, Exchange, Announcements and Dance Music. 8.15, Radio Journal. 8.30 (approx.), Close Down.

MALMO.—See Stockholm.

MILAN.—See Turin.

MORAVSKA-OSTRAVA

1,137 kc/s, 263.8 metres; 11 kW.—8.15 a.m., See Prague. 10.0, See Bratislava. 11.0, See Prague. 12.30 to 1.0 p.m., See Bratislava. 3.0 p.m., Concert by the Station Orchestra, conducted by Plichta; Soloists: Vera Repkova (Pianoforte) and Cerny (Violin); Overture, Op. 62 (Dvorak); Selection from The Bartered Bride (Smetana); Appassionata from Op. 17 (Suk); Slovak Song for Violin and Pianoforte (Kubat); Waltz from Princess Hyacinth (Nedbal); A Christmas Tale; Suite, Jeux d'enfants (Bizet); Scherzo-Waltz, Op. 40 (Moszkovski); Spanish Caprice, Op. 37 (Moszkovski); Pianoforte Solo: Scherzo, Op. 16, No. 2 (d'Albert); Melody (Godard); Polka from Schwanda the Piper (Weinberger). 6.30, See Prague.

MOTALA.—See Stockholm.

MUHLACKER.—See Stuttgart.

MUNICH

563 kc/s, 533 metres; 60 kW. Relayed by Augsburg and Kaiserslautern, 536 kc/s, 560 metres; and Nürnberg, 1,256 kc/s, 239 metres.—9.0 a.m., Catholic Service. 9.45, Chimes. 9.50, Reading from the Works of Leading Men. 10.15 to 11.0, See Leipzig. 11.0, Concert from the Feldherrnhalle: Overture, Dies ist der Tag des Herrn (Lachner); Liebesmahl der Apostel (Wagner); Selection from Hansel and Gretel (Humperdinck); Two Old German Peasant Dances (Merkling); Potpourri, Wir marschieren (Woitschach). 12 Noon, See Breslau. 1.0 p.m., Time, Weather, Announcements. 1.20, See Berlin (Funkstunde). 2.0, Christmas Concerto for Strings (Corelli). 2.30, For Children. 3.0, Concert: Sacred Music (Tunder-Buxtehude); Choral Prelude: Von Himmel hoch, da komm ich her (Bach); Two Chorals from the Christmas Oratorio (Bach); Variations on a Silesian Carol (Kusche); Christmas Music; Church Sonata for Violin and Organ (Haas); Four Songs for Organ and Soprano (Schadewitz); Four Old Christmas Carols (Beer-Waldbunn); Christmas Carols (Cornelius). 5.0, See Breslau. 5.35, Pianoforte Sonata in G Minor (Schumann). 6.0, Transmission for all German Stations, relayed from Berlin (Funkstunde). 7.0, See Leipzig. 8.30, See Breslau. 9.45, See Leipzig. 10.5, Weather, Sports Notes. 10.25, See Leipzig.

NAPLES.—See Rome.

NOTODDEN.—See Oslo.

OSLO

277 kc/s, 1,083 metres; 60 kW. Relayed by Fredrikstad, 815 kc/s, 368.1 metres; Hamar, 522 kc/s, 574.7 metres; Notodden, 671 kc/s, 447.1 metres; Porsgrund, 662 kc/s, 453.1 metres; Rjukan, 671 kc/s, 447.1 metres; and Jøløy, LCL, 6,990 kc/s, 42.92 metres.—8.45 a.m., Christmas Carols relayed from Trondheim, 605 kc/s, 495.8 metres. 9.20 a.m., Chimes and Divine Service, relayed from the Nidaros Cathedral, Trondheim. 4.0, Concert of Chamber Music by Fanny Elstad (Contralto), Oscar Harlem (Harp) and Hugo Kramm (Viola). Viola Solo: Largo (Bach); Aria for Contralto, Viola and Harp from Rinaldo (Handel); Contralto and Harp Duets: (a) Nu brister i alle de kløfter (Alnaes), (b) Melody (Selmer), (c) Ser du dyet funkle (Lindemann), (d) Der flyver sa mange fugler (Anderson); Viola Solos (Fauré): (a) Après un rêve, (b) Berceuse, (c) Elégie; Contralto Solo with Viola and Harp: Morgen (R. Strauss); Contralto Solo with Harp: (a) Le cygne (Saint-Saëns), (b) Svarte rosor (Sibelius), (c) Stille mit hjerte (Hannikainen); Contralto Solo with Viola and Harp: Ave Maria (Schubert). 4.50, Chimes. 5.0, Divine Service, relayed from St. Saviour's Church. 6.15, News. 6.30, Talk: Christmas Customs in the Country. 7.0, Time. 7.1, Earth—a Play in Three Acts (Carl Schönherr). After the Play, Talk.

OSTERSUND.—See Stockholm.

PALERMO

556 kc/s, 539.5 metres; 3 kW.—9.40 to 10.5 a.m., Sacred Music. 11.45, Giornale Radio. 12 Noon to 1.0 p.m., Records. In the interval: Time and News. 4.30, Records. 5.0 to 5.30, For Children. 7.0, Announcements. 7.20, Records. In the interval: Time and Announcements. 7.45, Chamber Music; Soloist: Mannino (Pianoforte); Sonata (Barbieri); Pianoforte Solo: Ballade (Chopin); Quartets: (a) Strimpellata (Castellnovato-Tedesco), (b) Canzonetta (Mendelssohn); Scherzo (Manno). After the Concert, Records. 10.0, Giornale Radio.

PARIS

EIFFEL TOWER, Call FLE, 207.5 kc/s, 1,445.7 metres; 13 kW. Time Signals (ou 2,650 metres) at 9.26 a.m. and 10.26 p.m. (Preliminary and 6-dot Signals).—12.30 p.m., Concert, relayed from Paris (Ecole Supérieure), 671 kc/s, 447.1 metres. 5.45, Le Journal Paris. 7.15, Weather. 7.25, News. 7.30, Conte de Noël—Play (Maurice Boucher). 8.0, Le Miracle de Théophile—Thirteenth Century Mystery Play (adapted by Gustave Cohen).

PARIS

POSTE PARISIEN, 914 kc/s, 328.2 metres; 60 kW.—10.0 a.m., Press Review and News. 10.15, Records of Christmas Carols; Symphonic Piece, Christmas (Koenigsberger); Noël des gneux (Vargnes). 10.30 p.m., Records: Plaisirs d'Hiver; Please; Rainger; Nous sommes deux copains; Say it isn't true; Ça fait peur aux oiseaux; Le roi fait battre tambour; Ma cousinette; Dessous le laurier blanc. 11.0, Records: Arias from (a) Hérodiade (Massenet), (b) La Traviata (Verdi), (c) The Damnation of Faust (Berlioz); Cavatina from Romeo and Juliet (Gounod); Waltz, Mon rêve (Waldteufel); Melody (Strauss); In the Temple of the Bells (Yoshitomo). 11.30, Extracts from Un mois de vacances (Mireille-Nohain), on Gramophone Records. 11.45, Records; Extracts from Marius (Pagnol); Extracts from Vignes du Seigneur (de Fiers and de Croisset). 12.10 p.m., Concert by the Station Orchestra: Overture, Oberon (Weber); Suite, España (Albeniz); Invocation à la nuit (Charpentier); Mascarede (Lacôme); Flute Solo: Concertino (Chaminade); Printemps nouveau (Vidal); Selection from Sappho (Massenet); Fête polonaise (Chabrier). 12.30, Sponsored Programme. 12.40, Orchestral Concert (cont'd.). 1.15, Orchestral Concert (cont'd.). 6.45, Exchange. 6.50, Records: Noël (Daquin); (Sœur Monique (Couperin). 7.0, A Short Film. 7.15, Le Journal Paris. 7.30, Catholic Review. 8.10, A Revue by Max Régénier and his Company. 8.55, Concert: Aria from Die Dreigroschenoper (Kurt Weill); Old Song, Retour du marin; Tango, Ippnickerty skip (Mackay); Jabberly Flip (Mackay); Air from Nina Rosa (Romberg); Les marins de Surcouf (Tranchant); Finesse (Maltin); Ducky (Peri). 9.45, Act I of Vive Paris—Revue, relayed from the Casino. 10.30, News.

PARIS

RADIO-PARIS, Call CFR, 174 kc/s, 1,725 metres; 75 kW.—7.45 a.m., Records. 8.0, News and Weather. 8.30, Gym. 12 Noon, Records; Part 1—Christmas Carols; Part 2—For Children. 2.0 p.m., Concert. 4.0, For Children. 5.0, Christmas Stories. 5.30, Concert by The Cadets, conducted by Nys; Selection from Ascanio (Mozart); In the Village (Ippolitov-Ivanov); March of the Sirdar (Ippolitov-Ivanov); Clair de lune (Debussy); Song from Deux sous de Fleurs (Benatzky); Hungarian Czardas (Leoni); Pourquoi quand je dis je t'aime (Valerio);

DEC. 25th **MONDAY** continued

Sevillá (Albeniz); Serenade (Kayners); Pavane pour une infante défunte (Ravel); Overture, Poet and Peasant (Suppé); The Pathetic Sonata (Beethoven); Match Parade (Weik); Rhapsody for Cello (Popper); Loin de toi (Hollander); Extreme orient (de la Presle); Selection from Madame Pompadour (Fall); Tristesse (Chopin); Danse Roumaine (Leoni); You are my Heart's Delight, from The Land of Smiles (Lehár); The Student Passes By (Ibanez); An der Frühling (Grieg); Selection from The Gipsy Princess (Kálmán); Dance from La Vida Breve (Fall); 7.30, Variety. 8.0, Le Petit Duc—Operetta (Lococo). In the intervals, News.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W3XK** on 48.86 metres and 25.27 metres.—12 Noon, Musical Clock. 1.0 p.m., Morning Devotions, from **New York**. 1.15, Don Hall Trio, from **New York**. 1.30, Lew White, Organist, from **New York**. 2.0, Breakfast Club, from **New York**. 2.45, Minute Manners. 3.0, Programme to be announced. 3.15, Clara, Lu n' Em, from **New York**. 3.30, Today's Children, from **New York**. 3.45, Irma Glen, Organist, from **New York**. 4.0, Four Southern Singers, from **New York**. 4.15, Sammy Fuller. 4.30, Rhythmic Ramblers, from **New York**. 4.45, Ella Graubart. 5.0, Gene Arnold, from **New York**. 5.15, Four Aces. 5.30, Programme to be announced. 5.45, Ernie Holst's Orchestra. 6.0, Farm and Home Hour, from **New York**. 6.30, Ernie Holst's Orchestra. 7.0, Musical Originalities, from **New York**. 7.30, Programme to be announced. 8.0, Radio Guild from **New York**. 9.0, Betty and Bob, from **New York**. 9.15, Egizi's Salon Orchestra. 9.30, Programme to be announced. 9.45, Words and Music, from **New York**. 10.0, Uncle Tom and Betty. 10.15, KDKA Kiddies' Klub. 10.30, The Singing Lady, from **New York**. 10.45, Orphan Annie, from **New York**. 11.0, Pat Haley. 11.15, Sports Notes and Programme Preview. 11.30, Egizi's Salon Orchestra. 11.45, Lowell Thomas, from **New York**.

WORSGRUND.—See Oslo.

PRAGUE

614 kc/s, 488.6 metres; 120 kW.—8.15 a.m., Reading. 8.35, Talk with Recitations. 9.0, Sacred Music. 10.0, See Bratislava. 11.0, Chimes and News. 11.15, Military Band Concert: March (Sykora); Overture, Il Guarany (Gomez); Slovak Dance (Chlup); Selection from Dalibor (Smetana); March (Dobrodinsky); Selection from Polenblut (Nedbal); National Dances (Provaznik); Overture (Hrimaly); March from The Bartered Bride (Smetana). 12.30 to 1.0 p.m., See Bratislava. 3.0, See Moravská-Ostrava. 4.30, Talk. 4.45, Records. 5.0, German Transmission: Reading and News. 6.0, News. 6.5, Readings. 6.25 Introductory Talk to the Following Transmission. 6.30, Der Freischütz—Opera in Three Acts (Weber), relayed from the State Opera House. In an interval: Talk. 9.20, News. 9.40, Records. 10.0 (approx.), Close Down.

RADIO-SUISSE ROMANDE

SOTTENS, 743 kc/s, 403 metres; 25 kW.; and **Geneva**, 395 kc/s, 760 metres.—10.0 (from **Lausanne**). Records. 11.30, News, Weather. 11.40 (from **Lausanne**). Records. 1.0 to 3.0 p.m., Interval. 3.0, See **Schweizerischer Landessender**. 5.0, Concert relayed from **Fribourg**. 5.35 (from **Lausanne**). Violin Recital by Oleis: Prelude and Allegro (Pugnani-Kreiser); Romance in G (Beethoven); Adagio from the Concerto in G minor (Bruch); Le zéphir (Hubay); Introduction and Tarantella (Sarasate). 6.5 (from **Lausanne**). Christmas Carols by a Mixed Choir, conducted by Theunillat. 6.25 (from **Lausanne**). Christmas Poems. 6.40, (from **Lausanne**). Song Recital by Marcel Crot (Baritone): Song (Schubert); Four Carols; Nocturne (César Franck). 7.0, Recitations. 7.10 (from **Lausanne**). The Flight into Egypt—Poem (Flechter) with Music by Steierlin-Yallon. 7.30 (from **Lausanne**). Concert by the Small Radio Lausanne Orchestra, conducted by Moser. Soloist: Flore Gabella (Songs). 8.30 (from **Lausanne**). A Christmas Mystery. 9.0, News and Weather.

RJKUKAN.—See Oslo.

ROME

Call **IRO**, 680 kc/s, 441 metres; 50 kW. Relayed by **Naples**, 941 kc/s, 319 metres; **Milan (Vigentino)**, 662 kc/s, 453.1 metres from 7.40 p.m.; and **ARO**, 11,810 kc/s, 25.4 metres.—11.0 a.m., High Mass. 11.30, Records of Opera Music. 1.0 p.m., Time and Announcements. 4.0, Concert: Dance from La Pisanella (Pizzetti-Corti); Tzigane (Ravel); Two Arias from Werther (Massenet); Pianoforte Solos: Two Popular Spanish Songs (arr. Lapaara). (a) En décembre. (b) Sevillana; Waltz Song from The Wily Widow (Wolf-Ferrari); Tenor Solo from La Favorita (Donizetti); Violin Solos. (a) Guitars (Maszkowsky). (b) Moto perpetuo (de Guarnieri); Polonaise from Mignon (Thomas). 6.30, Records. 7.0, Time, News and Records. 7.5, Song Recital. 7.40, Concert of Light Music. In the interval, Talk: Allegro and Minuet (Handel); Rondo (d'Andriani); Popular Songs of Cuba; Eighteenth Century French Songs; Toccatà

(Paradisi); Minuet (Rutini); Popular Italian Dance; Monologue; Dance Music. 10.0, Giornale Radio.

SALZBURG.—See Vienna.

SAN SEBASTIAN

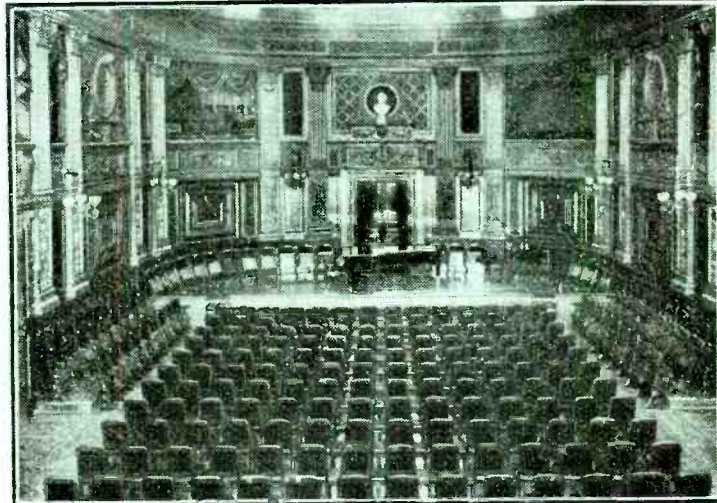
EAJ8, 662 kc/s, 453.1 metres; 0.6 kW.—1.0 a.m. (Tuesday) till Close Down, Programme in English by the I.B.C. 1.0, Light Music: The Skaters' Waltz (Waldteufel); Song of the Islands (King); Selection from The Count of Luxembourg (Lehár); Song: Down in the Valley (Harrington); Julien (Donata); The Clock is playing (Pierre); Hungarian Medley (arr. Legett); Snacks in Bars (Egger). 1.30, Gramophone Concert: March. Kamschamola; Luis XIII Song (Couperin-Kreisler); Waltz from The Vagabond King (Friml); Hungarian Dance No. 6 (Brahms); Variation on Themes from The Magic Flute (Mozart); Volga March (Dostal); Meditation from Thaïs (Massenet); O come all ye Faithful (Traditional). 2.0, I.B.C. Good-night Melody and Close Down.

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 60 kW. Relayed at intervals by **W2XAF** on 31.48 metres and by **W2XAD** on 19.56 metres.—7.30 p.m., Revolving Stage, from **New York**. 8.0, Health Hunters. 8.15, Soloist, from **New York**.

SCHWEIZERISCHER LANDESENDER

BEROMUNSTER, 653 kc/s, 459 metres; 60 kW.; **Bâle**, 1,229 kc/s, 244.1 metres; and **Berne**, 1,220 kc/s, 245.9 metres.—10.15 a.m. (from **Zürich**). Records. 10.40 (from **Zürich**). Christmas Play in Dialect. 11.0 (from **Zürich**). Records. 11.29, Time and News



A CHRISTMAS MORNING BROADCAST. The celebrated Gewandhaus of Leipzig. The Gewandhaus and Municipal orchestras combine with the choirs of St. Thomas this morning in the Bach Cantata: "Sehet, welch' eine Liebe," to be broadcast from Leipzig at 10.30.

11.40 (from **Zürich**). The Beromünster Orchestra. 12.30 p.m. (from **Zürich**). Reading of Christmas Stories. 1.0 to 1.30 (from **Zürich**). The Anton Smetak Zither Trio. 3.0 (from **Zürich**). A Christmas Concert. 3.50 (from **Zürich**). Christmas Poems for Children. 4.0 (from **Zürich**). Glory to God in the Highest—a Biblical Sequence for Children, with Music by Pestalozzi. 5.0 (from **Zürich**). Catholic Service. 5.30 (from **Zürich**). Records. 6.0 (from **Zürich**). Time and Sports Results. 6.10 (from **Zürich**). Talk on the Christmas Song. Stille Nacht. 6.30 (from **Zürich**). Records. 7.0 (from **Zürich**). Christmas Carols. 8.0, News. 8.10 (from **Zürich**). The Beromünster Orchestra. 9.15 (from **Zürich**). Sports Report.

SOTTENS.—See Radio-Suisse Romande.

STOCKHOLM

689 kc/s, 436 metres; 55 kW. Relayed by **Boden**, 242 kc/s, 1,239.5 metres; **Göteborg**, 932 kc/s, 322 metres; **Hörby**, 1,167 kc/s, 257 metres; **Motala**, 222.5 kc/s, 1,347 metres; **Ostersund**, 402 kc/s, 746.2 metres; and **Sundsvall**, 554 kc/s, 542 metres.—10.0 a.m., High Mass, relayed from a Church in **Falun**. 9.77 kc/s, 307 metres. 11.45, Weather and Ice Report. 1.0 p.m. (from **Göteborg**). Christmas Carols with Commentary. 2.0, For Children. 3.0, Military Band Concert, conducted by Ivar Widner: Extracts from Il Trovatore (Verdi); Schubert Fantasia (Urback); Christmas Medley (Peterson-Berger); Polpouri, Sangarminnen (Widner); March from Gustaf Vasas sage (Hallen). 4.0,

Weather. 4.5, Records. 5.0 (from **Göteborg**). Evensong. 6.15, Weather and News. 6.25 to 10.0, Programme for Swedes Abroad. 6.25, Talk. 6.45, Cantata to the Memory of Arthur Hazelius (Rangström); The Girl from the Marsh—Play (Herbert Grevinius) after the Novel by Selma Lagerlöf. 9.0, Weather. 9.5, Programme for Swedes Abroad (contd.); The Radio Orchestra, conducted by Nils Grevinius: Festsapel (Arven); Symphonic Poem, Hemitra (Lindberg); Aria from Pastoralsvit (Attarberg); Three Pieces for Strings (Kallstenius); Fritjof och Ingeborg (Broman).

STRASBOURG

869 kc/s, 345 metres; 11.5 kW.—9.30 a.m., Protestant Service from St. Stephen's Church, Mulhouse. 10.30, Gramophone Concert. 11.30, Catholic Service. 12 Noon, Gramophone Concert. 12.45 p.m., News. 1.0, Time Signal. 1.1, Gramophone Concert: Selection from The Merry Widow (Lehár); Narcissus (Nevin); Berceuse (Drocher); Bruits des berceux (Botrel); Waltz, Barcelona (Warms); Paris qui brille (Mahieux); Selection from Les Saitimbanques (Ganne); Mon ami Pierrot (Graf); Petit bonheur (Christiné); Canzone (Bixio); Guitarita (Fragua); Selection from Lilac Time (Schubert-Berté). 3.0 p.m., Gramophone Concert Bell Ringer; Sedihal; Le Moulin; El Caballero (Haleb); Mamita (Delfino); Carufa (Collaze); Les trois baisers; Sib; Sige no mas; Galate Corazon; Two Melodies; Aria from Frederica (Lehár); Aria (Lehár); Song from The Desert Song (Romberg). 4.0, Orchestral Concert, conducted by Roskam. 6.0, Fortnightly Literary Review. 6.15, Talk in German: Christmas Customs in Alsace-Lorraine. 6.30, Gramophone

from The Propnet (Meyerbeer); Overture, Benvenuto Cellini (Berlioz); Selection, Madame Butterfly (Puccini); Prelude to Carmen (Bizet). 2.30, Songs. 2.45, Orchestral Music: The Grasshoppers' Dance (Bucalossi); Melody (Friml); Ständchen (Heykens); Selection, Waltzes from Vienna (Joh. Strauss). 3.0, Concert of Christmas Music. 3.30, Orchestral Music: Dance, Sádomé (R. Strauss); Selection, Vardar (Uladigerov); Liebeslied (Strauss). 4.0, Opera Arias: Arias from The Magic Flute (Mozart), Philémon et Baucis (Gounod), Don Giovanni (Mozart) and L'Africaine (Meyerbeer). 4.15, Operetta Music: Selection, Ginette et moi (Messier); Melody (Lawrence); Selection, The Desert Song (Romberg). 4.30, Music from Sound Films. 4.45, Military Music. 5.0, The dansant. 5.45, Music by an Argentine Band. 6.0, News. 6.15, Opera Music: Aria from Carmen (Bizet); Aria from Madame Butterfly (Puccini); Prologue, to Il Pagliaccio (Leoncavallo); Duet from La dame blanche (Boieldieu). 6.30, Music by a Viennese Orchestra: Waltz, The Blue Danube (Joh. Strauss); Les grenadiers (Waldteufel); Selection from The Land of Smiles (Lehár); Dance Potpourri (Dostal); Melody (Ivory). 7.0, Chansonnettes. 7.15, News. 7.30, Divertissement on Russian Songs (Rabaud), by the Station Orchestra. 7.45, Operetta Music: Arias from Frasquita (Lehár), Oh, Papa (Yvain), and La tulipe noire (Richepin). 8.0, Light Music. 8.30, Chamber Music: Polonaise in A (Chopin); Dolls' Dance (Hayek); Union Reel; Wedgwood Blue (Kettelhey). 8.45, Tango Songs. 9.0, Hunting Horn Solo. 9.20, Faust—Opera in Five Acts (Gounod). 10.15, News. 10.30, Opera (contd.). 12.25 a.m. (Tuesday), News.

TRIESTE

1.2, 11 kc/s, 247.7 metres; 10 kW.—8.55 a.m., Mass from the Cathedral of San Giusto. 10.0 a.m. to 1.15 p.m., See **Turin**. 3.45, Bailista Programme. 4.10 till Close Down, See **Turin**. **TRONDHEIM**.—See Oslo.

TURIN

1,006 kc/s, 273.7 metres; 7 kW. Relayed by **Milan**, 903 kc/s, 332.2 metres; **Genoa**, 959 kc/s, 312.8 metres; and **Florence**, 598 kc/s, 501.6 metres.—10.0 a.m., Mass from the Church of the Annunciation, Florence. 11.30, Records. 11.45 a.m. to 1.45 p.m., Trio Concert 12 Noon, Time, Announcements. 3.45, Announcements. 4.10, Orchestral Concert, conducted by Tito Petralia. 4.55, Weather. 5.0, Announcements. 6.0, Time and News in Foreign Languages. 6.30, Records. 6.50, Announcements. 7.0, Records. 7.30, Announcements. 7.40, Chamber Music. 8.30, One-Act Comedy. 9.0, Records. 9.30, Dance Music. 10.0, Giornale Radio.

VATICAN CITY

15,120 kc/s, 19.84 metres (Morning); and 5,969 kc/s, 50.26 metres (Evening); 10 kW.—10.0 to 10.15 a.m., Religious Information in Italian. 7.0 to 7.15 p.m., Religious Information in Italian.

VIENNA

580 kc/s, 517.2 metres; 100 kW. Relayed by **Graz**, 852 kc/s, 352.1 metres; **Innsbruck**, 1,058 kc/s, 283 metres; **Klagenfurt**, 662 kc/s, 453.1 metres; **Linz**, 1,220 kc/s, 245.9 metres; and **Salzburg**, 1,373 kc/s, 218.5 metres.—9.20 a.m., Choral Concert, conducted by Leopold Emmer. 9.50, Traum van Capri—Reading. 10.10, Light Music by the Wiener Symphoniker, conducted by Max Schröhrer. 12.10 p.m., The Week's Review. 12.30, Orchestral Concert of Contemporary Swiss Music, conducted by Kurt Rothenbühler: Soloists, Viktor Brégy (Tenor) and Felix Löffel (Bass). 2.0, Time and Announcements. 2.5, Book Review. 2.30, Brass Band Concert. 4.0, Talk, with Record Illustrations: Christmas among the Spanish Fedsmen. 4.30, The Mairecker Quartet. 5.30, Die Gabe des Weisens (Hayek). 6.0, Song Recital by Elizabeth Schumann. 6.50, Time and Announcements. 7.0, Der Lustige Krieg—Operetta (Joh. Strauss). 9.15, News and Weather. 9.30, Records.

WARSAW

212.5 kc/s, 1,411 metres; 120 kW.—8.50 a.m., Announcements. 9.0, Divine Service from **Lwów**. 10.57, Time Signal and Fanfare from St. Mary's Church, Cracow. 11.5, Announcements. 2.0 p.m., Orchestral Concert, relayed from **Lwów**. 3.0, Programme for Children, relayed from **Lwów**. 3.30, Records. 3.45, Reading. 4.0, Orchestral Concert: Polonaise (Brzezinsky); Mazurka (Tymolsky); Couciavienne; Oberek (Namyslowsky); Polka (Suchocky); Mazurka (Wronsky); Polish Waltzes (Dzierzanowsky); Dance (Miszezak); Soldiers' Songs (Suchocki). 5.0, Dramatic Programme. 5.40, Talk. 5.45, Announcements. 6.0, Peace and Good Will—Christmas Greetings from the Capitals of Europe. 7.0, Programme, relayed from **Lwów**. 8.0, Reading. 8.15, Pianoforte Recital of Polish Music by Młue-Rabcewicz: Sonata in C Minor, Op. 8 (Szymanowsky); Two Polish Dances (Rozycy); Three Pieces (Paderewsky); (a) Sarabande, (b) Polonaise, Op. 9 (c) Cracovienne fantastique. 9.5, Sports Notes. 9.10, Dance Music on Records. 10.0, News. 10.5, Dance Music on Records (contd.). **ZÜRICH**.—See **Schweizerischer Landessender**.

STUTTGART

MUHLACKER, 563 kc/s, 533 metres; 100 kW. Relayed by **Freiburg**, 1,157 kc/s, 259.3 metres, and 527 kc/s, 570 metres (until January 16, 1934).—8.30 a.m., Programme from **Frankfurt**. 9.0, See **Langenberg**. 10.0, The Stuttgart Motet Choir. 10.30, See **Leipzig**. 11.0, See **Frankfurt**. 12 Noon, First Act of La Bohème—Opera (Puccini), on Records. 12.30 p.m., Es war einmal ein Musikus—Talk and Records. 1.20, See **Berlin (Funkstunde)**. 2.0, For Children. 3.0, Concert. 3.45, Concert by the Station Orchestra, conducted by Ferdinand Drost; Karl Jagen (Tenor). 5.0 to 6.0, See **Frankfurt**. 6.0, Transmission for all German Stations, relayed from **Berlin (Funkstunde)**. 7.0, Sports Notes. 7.10 to 9.20, See **Frankfurt**. 9.20, Things you should know. 9.30, Local News. 9.45, Sketch with Vocal and Instrumental Concert. 10.45, The Ghost in the Music Shop—Sketch (Carl Struve). 11.30, Serenade.

SUNDSVALL.—See Stockholm.

TOULOUSE

779 kc/s, 385 metres; 8 kW.—2.0 p.m., Concert of Opera Music: Coronation March

ALGIERS

825.5 kc/s, 363.3 metres; 13 kW.—12.30 p.m., The Station Orchestra. 1.0, News. 1.5, The Station Orchestra (contd.). 7.0, Exchange. 7.10, Shipping Notes. 7.15, Weather. 7.20, Airs from Boris Godunov (Mussorgsky) on Records. 7.55, News. 8.0, Time and Lottery Results. 8.10, Sonata for Violin and Piano-forte (Virardot). 8.40, Symphonic Poem, La Mer (Debussy), on Records. 9.0, Oriental Music. 9.30, News. 9.35, Oriental Music (contd.). 9.55, News.

ATHLONE

725 kc/s, 413 metres; 60 kW. Relayed by Dublin, 1,382 kc/s, 217 metres; and Cork, 1,337 kc/s, 224.4 metres.—6.0 p.m., For Children. 6.45, News Bulletin. 7.0, Talk by C. M. Ni Dhubhghall. 7.15, Music by the Station Orchestra. 7.30, Soprano Solos by Kathleen McCully. 7.45, Annual Pantomime with Orchestral Music. 8.45, Tenor Solos by N. O'C Redmond. 9.0, Violin Solos by Oakley. 9.15, Bass-Baritone Solos by M. O'C Maguire. 9.30 to 10.30, Programme by the I.B.C. (Ireland), Ltd. 9.30, Military Band Music: Signature Tune, Choo, Choo; Overture, Zampa (Hérold); Præliudium (Jännefelt); Les Cloches de St. Malo (Rimsky); Siren Magic Waltz (Waldteufel); Signature Tune, Choo, Choo. 9.45, Dance Music: Dinner at Eight (McHugh); This is Romance; I don't like her dog, Fido (Woods); The song that you gave to me. 10.0, Dance Music: There's no harm in hoping; By a Waterfall; I want to ring bells; Racing Commentary; Sittin' on a backyard fence; Just a year ago to night; Beloved; Darkness on the Delta. 10.30, I.B.C. Goodnight Melody, followed by News. 10.40, Irish Music.

BARCELONA

EAJ1, 861 kc/s, 348.4 metres; 8 kW.—7.15 a.m., Radio Journal and Gramophone Records. 8.0, Chimes, Physical Culture and Gramophone Music. 8.20, Radio Journal and Gramophone Music. 9.0, Announcements. 11.0, Chimes, Weather. 12.0 Noon, Programme for Women. 12.45 p.m., Gramophone Music. 1.0, Gramophone Records of Light Music. 1.30, Theatre Notes and Gramophone Music (contd.). 2.0, Catalan Notes and Sextet Concert. 3.0, Programme for Hospitals, with Gramophone Records. 6.0, Trio Concert: Selection from The Flying Dutchman (Wagner); Valse lente in A Minor (Chopin); Rondo (Elgar); Selection from Samson and Delilah (Saint-Saëns); Selection from A Masked Ball (Verdi); Italian Song (de Taeye); March (Fucik). 7.0, Request Gramophone Records. 7.30, Exchange and Talk in Catalan. 8.0, Gramophone Music. 8.30, Catalan Educational Programme: History and Geography Lessons, followed by News. 9.0, Chimes and Weather. 9.5, Announcements, Messages to Seamen, Exchange and Market Prices. 9.10, Concert by the Radio Orchestra. 10.0, Symphony Music (on Gramophone Records). 11.0, News and Dance Music, relayed from the Casa Llibre.

BARI

1,112 kc/s, 269.8 metres; 20 kW.—No Transmission.

BASLE.—See Schweizerischer Landessender.

BELGRADE

698 kc/s, 429.7 metres; 2.8 kW.—10.0 a.m., The Radio Orchestra. 10.20, Tides Report. The Radio Orchestra. 10.59, Time, Chimes. 11.5, The Radio Orchestra. 11.35, Exchange, Records. 12.30 p.m., News, Time. 3.0, The Radio Orchestra. 5.0, Song Recital by Mme. Ljubica Milivojevic. 4.30, Dance Music. 5.55, Time, Programme Announcements. 6.0, Records. 6.15, Violin Concerto, Op. 46 (Rubinstein), by Karl Holub. 7.5, See Prague. 9.0, Time, News; Records. 9.45, Cigany Music from the Kesma Restaurant.

BERLIN

DEUTSCHLANDSENDER (REICHSENDER), 183.5 kc/s, 1,635 metres; 60 kW.—7.30 a.m., Records. 8.0, Reading. 8.15, Chamber Music: Part I: Songs by Günter Stenzel and Anton Topitz, by Lotte Teile; Serenade for Flute, Violin and Viola, Op. 25 (Beethoven). 9.5, See Berlin (Funkstunde). 10.0, Weather. 10.15, Between Time and Eternity—Radio Sequence from the Works of Dietrich Eckart, on the Tenth Anniversary of his Death. 11.0, See Munich. 11.55, Time. 12 Noon, See Stuttgart. 1.0 p.m., Talk. 1.20, A Children's Choir. 2.0, The Steinbock Orchestra. 3.0, See Langenberg. 4.0, Robinson must not die—Play (Friedrich Forster). 5.0, For Children. 6.0, Humorous Musical Programme. 7.0, Christmas Programme by Herbert Ernst Groll, Paul Hörbiger and the Station Orchestra. 9.0, News. 9.35, Radio Report of the Ice Hockey Match. 9.45, Weather. 10.0, Light Music and Dance Music from the Excelsior Hotel. 1.30 a.m. (Wednesday), Close Down.

BERLIN

FUNKSTUNDE, 832 kc/s, 360.5 metres; 100 kW. Relayed by Zeesen, DJC, DJA, DJD, DJB, and DJE.—7.55 a.m., Chimes and Sacred Music, relayed from the Potsdam Garrison Church, Chimes from Berlin Cathedral. 9.5, Weather. 10.0, For Children. 11.0,

See Munich. 12.5 p.m., The Small Station Orchestra, conducted by Steiner: Overture, Der Dildschütz (Lortzing); Solvig's Song (Grieg); Elfentanz (Heykens); Folk Song, Spinn, spinn; Waltz (Waldteufel); Selection from La Traviata (Verdi); The Tyrol in Song and Dance (Fetras). 1.0 p.m., See Leipzig. 2.0, Christkindla in Schlesien—a Nativity Play (Otto Eggers-Rotter). 3.0, The Station Orchestra, conducted by Werner Richter Reichhelm: A Comedy Overture (v. Reznick); Jeux d'enfants (Bizet); Waltz, Op. 51 (Glazunov); Extract from Tsar Saltan (Rimsky-Korsakov); Overture, Der Opernball (Heuberger); Waltz, Windsor-Klänge (Joh. Strauss); Selection from La Poupée (Audran); Waltz, Toujours ou jamais (Waldteufel); Selection from The Land of Smiles (Lehár); Overture, Isabella (Suppé). 5.0, A Family Christmas—a Puppet Play with Music (Heynick). 5.40, Sports Notes. 6.0 to 8.20, See Munich. 8.20, The Small Station Orchestra, conducted by Willy Steiner; Wiegeliend (Kaun) The Kiss Waltz (Waldteufel); Peasant Suite (Ailbouth); Serenata appassionata (Steiner); Waltz, Flattergeister (Jos. Strauss). 9.0, News. 9.30 till Close Down, See Hamburg.

BERNE.—See Schweizerischer Landessender.

BEROMÜNSTER.—See Schweizerischer Landessender.

BODEN.—See Stockholm.

BODO.—See Oslo.

BORDEAUX-LAFAYETTE

986 kc/s, 304 metres; 13 kW.—7.45 a.m., News, relayed from Paris (Ecole Supérieure), 671 kc/s, 447.1 metres. 10.30, Instrumental Concert, relayed from Toulouse (PTT), 1,176 kc/s, 255.1 metres. 12 Noon, Concert, relayed from Paris (Ecole Supérieure). 12.30 p.m., Time and Dance Music. In the interval, News. 1.50, Exchange. 2.0, Chamber Music and Variety Music. 4.30, Chamber Music, relayed from Lyons (La Doua), 644 kc/s, 465.8 metres. 6.15, Radio Journal, relayed from Paris (Ecole Supérieure). 7.35, News. 7.40, Talk for Women. 7.55, Lottery Results. 8.5, Talk, relayed from Paris (Ecole Supérieure). 8.15, News, Market Prices and Weather. 8.30, See Paris (Eiffel Tower). After the Programme, Amusement Guide and Time.

BRATISLAVA

1,073 kc/s, 279.5 metres; 14 kW.—8.0 a.m., Talk, with Record Illustrations: Christmas in Song. 9.0, See Prague. 10.0, See Brno. 11.0, See Prague. 11.15, See Moravská-Ostrava. 12.30 p.m., See Prague. 1.5 to 1.10, Tides Report. 3.0, The Station Orchestra, conducted by Dyk. 4.30, Concert, relayed from the Institute for the Blind. 6.0, See Prague. 9.15, See Brno. 10.0 (approx.), Close Down.

BREMEN.—See Hamburg.

BRESLAU

923 kc/s, 325 metres; 60 kW. Relayed by Gleiwitz, 1,186 kc/s, 253.1 metres.—8.0 a.m., Christmas Tales. 8.30, Christmas Carols (arr. Friedrich Wirth), by the Station Orchestra and Soloists. 9.10 (from Gleiwitz), Talk: Christmas in the Colonies. 9.30, The Station Orchestra and Soloists. 11.0, See Munich. 12.0 Noon, Military Band Concert. 1.0 p.m., See Leipzig. 2.0, Chamber Music. 2.30, For Children. 3.0 to 5.0, See Munich. 5.0, Talk: A Naturalist's Christmas Walk. 5.20, Fiddle Solos and Songs with Introductory Talk. 6.0 to 8.20, See Munich. 8.20, The Station Orchestra, conducted by Topitz: Overture, Lachendes Leben (Rust); Waltz, Mein Lebenslauf ist Lieb und Lust (Joh. Strauss); Potpourri (Komzak); Polka (Jos. Strauss); Intermezzo (Tautenhayn); Waltz (Ziehrer); March (Netsch); Potpourri (Gangleberger); Galop (Ziehrer). 9.30, See Leipzig. 9.50, Time, News, Weather. 10.5, See Leipzig.

BRNO

878 kc/s, 342 metres; 35 kW.—10.0 a.m., Children's Concert. Overture, To the Story of the Lovely Melusina (Mendelssohn); Children's Songs (Blech); The Children's Corner (Debussy). 11.0, See Prague. 11.15, See Moravská-Ostrava. 12.30 p.m., Agricultural Talk. 3.0, See Bratislava. 4.30, Carol Singers—Scene (Kroupa). 4.50, Records. 5.0, German Transmission: Christmas Story (Schützler) and Christmas Shopping—Play. 6.0, See Prague. 9.15, Concert by the Station Orchestra, conducted by Bakala. Overture, Orpheus in the Underworld (Offenbach); Waltz from The Geisha (Jones); Selection (Benes); Russian Song (Friml); Czech Dance (Balling); March, Uncle Teddy (Fucik); Cradle Songs (Kapral); Marionettes (Kriska).

TUESDAY

DECEMBER THE TWENTY-SIXTH

BRUSSELS (No. 1)

I.N.R., 590 kc/s, 509.2 metres; 15 kW.—12 Noon, Programme by Mickey's Club Jazz Attraction. 1.0 p.m., Le Journal Parlé. 1.10, Programme by Mickey's Club Jazz Attraction (contd.). 5.0, Extracts from Les Cloches de Corneville—Operetta (Planquette) on Records. 6.0, Talk: Christmas. 6.15, Concert by the Small Station Orchestra, conducted by Leemans: Overture, Heinkeltr aus der Fremde (Mendelssohn); Nocturne (Dupuis). 6.45, News. 7.5, Czech Concert, relayed from Prague. 8.0, Talk for Women and Art Notes. 8.10, Concert from Prague (contd.). 8.45, Records: Andaluza (Falla); Choral in A Minor (Franck). 9.0, Dance Music, relayed from the Saint Sauveur Dance Hall. 10.0, Le Journal Parlé.

BRUSSELS (No. 2)

N.I.R., 888 kc/s, 337.8 metres; 15 kW.—12 Noon, Concert by the Small Station Orchestra, conducted by Leemans: Paso doble, Pan y Toros (Dessart); Waltz, Die Kosen den (Lainer); Intermezzo, Burlesca (Culotta); Records: (a) Pimpinella (Tchaikovsky); (b) Vieni sul mar; Selection from The Christmas Fairy (Pätzner); Selection from Hansel and Gretel (Humperdinck); Records: (a) Cara Piccini (Lama); (b) Regniella (Lama); Sérénade d'Arlequin (Van Dam); Foxtrot, Wer einmal nur geküsst ein Mädchenchen (Mann und Weiss). 1.0 p.m., Le Journal Parlé. 1.10, Records: Selection from Countess Maritza (Kálmán); Mattinata (Leoncavallo); Pour un baiser (Tosti); La capinera (Benedict); Waltz, Parla (Arditti); Selection from Wender Bar (Katscher); Il tunza delle cajinera (Bixio); Song: A.B.C. (Cosentino); Selection from Polly to be wise (Hupfeld). 5.0, Concert by the Station Orchestra, conducted by Walpot: Hungarian Comedy Overture (Kéfer Béla); Rossini Potpourri (Tavan); Records: (a) Song of the Volga Boatmen; (b) The Mighty Deep (Juda); Waltz, Moonlight on the Alster (Fetras); The Butterfly Chase (Kéfer Béla); Overture, Chal Romano (Ketelbey); March (Blankenburg). 5.45, Programme for Children. 6.30, Talk. 7.0, Song Recital by Armand Crabé (Baritone); Rubin (Crabé); Na coieta; La yota (Falla); Ay, ay, ay (Sobrinco). 7.15, Variety Items. 7.30, Talk for Women. 8.0, Accordion Recital by Vervest and Kemna: One-step, Click and Clack (Doyer); Waltz, Rossy (Boets); Tango, Zigenner, you have stolen my heart (Vaek); Melody (Wood); Foxtrot, Please (Donaldson). 8.15, Mencke—a Monologue in Seven Scenes (Vs Vissel). 9.15, Concert by the Station Orchestra, conducted by Walpot: Melody (Elsler); Overture, The Gipsy Baron (Joh. Strauss); Valse lente (Chopin). 9.30, Accordion Recital (contd.). Waltz (Vaek); Tango (Vaek); Foxtrot, Butterfly (Wood); Waltz (Stolz); March (Van Haverberghe); Military Waltz. 9.45, Orchestral Concert (contd.): Marche aux flambeaux (Meyerbeer); Waltz, Künstlerleben (Joh. Strauss); Perpetuum mobile (Joh. Strauss). 10.0, Le Journal Parlé.

BUCHAREST

760 kc/s, 394.7 metres; 12 kW.—11.0 a.m., Records. 12 Noon, Radio Journal. 12.15 p.m., Records. 4.0, Variety Music by the Motoi Orchestra. 5.0, Radio Journal. 5.15, Orchestral Concert (contd.). 6.0, Educational Talk. 6.20, Records. 6.45, Talk. 7.0, Piano-forte Recital of Romanian Music by Madeleine Cocorasco. 7.30, Talk. 7.54, Romanian Song Recital by Georges Folesco (Bass). 8.15, Dance Records. 8.45, Radio Journal. 9.0, Light Music from the San Remo Restaurant.

BUDAPEST

545 kc/s, 550.5 metres; 120 kW. Also relayed on 840 metres from 6.0 p.m. till Close Down.—10.15 a.m., Divine Service from the Greek Church. 11.30, Guitar, Viola da gamba and Viola d'amor Solos and Songs. 12.45 p.m., Military Band—Concert, conducted by Fricsay. 2.0, For Girls. 2.30, Records. 3.30, Talk: Edmond de Amicis. 5.20, Sports Notes. 5.30, Talk. 6.0, Christmas Festival in Hungary—Relay from Szany. 7.0, Leljár Potpourri from Vienna. 8.30, News. 8.50, The Hetenyi-Buday-Seloh Trio from the Café Simphon. 10.0, Talk in English, with Records: Christmas Customs. 10.30, The Imre Magyar Cigany Band from the Hotel Hungaria.

CASSEL.—See Frankfurt.

COPENHAGEN

1,067 kc/s, 281 metres; 0.75 kW. Relayed by Kalundborg, 260 kc/s, 1,153.8 metres,

and Skamlebaek, OXY, on 31.51 metres.—7.0 a.m., Gym. for Women. 7.15, Gym. 9.0, Divine Service. 10.30, Weather. 10.40, News. 11.0, Time and Chimes from the Town Hall. 11.5, Carl Rydahl's Instrumental Ensemble. Overture, Mariana (Wallace); Waltz, Soirée d'été (Waldteufel); Selection, from Lilac Time (Schubert-Berté); Moment musical (Schubert); Norwegian Dance in G (Grieg); La lettre de Manon (Gillet); Gipsy Tango (Lacôme); Barcarolle, Le beau rêve (Flegier); Serenade (Kubin); October from The Seasons (Tchaikovsky); March (Kral). 12.30 p.m., Extracts from Aida—Opera (Verdi) on Records. 1.30, Programme for Children. 2.0, Talk for Housewives. 2.10, Accordion Music: March (Oscheit); Mazurka (Beiro); Serenade from Les Millions d'Arlequin (Drigo); Tango (Anderson); Polka (Johansson); Waltz (Cederqvist-Schmidt); Piece (Normann Andersen). 2.40, Reading (A. J. Cronin). 3.0, Orchestral Music, relayed from the Wivex Restaurant. 4.0, Divine Service. 5.20, Talk. 5.50, Weather. 6.0, News. 6.15, Time. 6.30, Quintet in A for Clarinet, Two Violins, Viola and Cello (Mozart). 7.0, Time from the Town Hall. 7.2, Song Recital by Christian Gottschalch. 7.30, A Comedy in One Act (Jens Lecher). 7.45, Songs from The People of Copenhagen—Sound Film (Carl Vigo Meinke). 8.10 p.m. to 1.0 a.m. (Wednesday), Christmas Radio Ball. 8.10, Dance Music. 8.45, News. 9.0 (approx.), Dance Music (contd.). 10.15, Programme by The Valencia Orchestra, conducted by Kai Julian. 11.0, Time and Chimes from the Town Hall. 11.5 (approx.), Orchestral Music from the Ritz Restaurant. 12 Midnight, Orchestral Concert, relayed from the Nimb Restaurant, conducted by Jens Warny. 1.0 a.m. (Wednesday), Close Down.

CORK.—See Athlone.

DANZIG.—See Heilsberg.

DRESDEN.—See Leipzig.

FECAMP

1,328 kc/s, 225.9 metres; 10 kW.—11.0 a.m. to 12 Noon, Programme in English by the I.B.C. Happy Hour. Part I: Orchestral Concert. Part II: Dance Music. 12 Noon, Programme in French. 3.30 to 6.0 p.m., Programme in English by the I.B.C. 3.30, Concert for Tourney and Exeter Listeners. Part I: Hawaiian Band. Part II: Dance Music. 4.30, The I.B.C. Nursery Corner. Birthday Greetings. 5.0, Concert for Plymouth and Devonport Listeners. Light Music. The Music Clock of Madame Pompadour (Noack); Baby won't you please come home; Gipsy Moon (Borganov); Happy Dainties (Godfrey); Pianoforte Selection Words and Music (Noel Coward); Siboney (Lecuona); In a Clock Store (Orth); The Brooklyn Cakewalk (Thurban); Pianoforte Selection from He Wanted Adventure (Walker); Song, Reflections in the Water (Loeb); The Dance of the Nymphs (Birch); A Charming Episode (Ormandy); Signature Tune. 5.45, Concert of Dance Music. Old Fashioned Sweethearts; I only want one girl; Missouri Waltz; A Couple of Fools in Love. 6.0, Programme in French. 10.0 (approx.), till Close Down, Programme in English by the I.B.C. 10.0 (approx.), Dance Music. 10.30, Military Music. Here, There and Everywhere (Bose); Selection from The Miracle (Humperdinck); Cupid's Army (Sievier); The Doge's March (Rosse); Waltz, Les Sirènes (Waldteufel); Le Grandier March (Mohr); La Bénédiction des Poignards (Meyerbeer); Jolly Fellows (Vollstedt). 11.0, Orchestral Concert. Intermezzo Selection (arr. Antcliffe); Barcarolle (Waldteufel); Violin Solo, Chanson bohémienne (Baldi); By the Swane River (Myddleton); Selection from Wiener Blut (Joh. Strauss); Song, Throw open wide your window (Carlson); Pale Volga Moon (O'Hagan); Nautical Moments (arr. Winter). 11.30, I.B.C. Time Signal. 11.31, Concert arranged by the International Broadcasting Company (Ireland), Ltd. Signature Tune, Come back to Erin; Mazurka, La Czarine (Ganne); Acclamations Waltz (Waldteufel); In Far away Donegal (Alexander); Play of the Butterflies (Heykens); Song, My Mother's Garden (Hanley); Irish National March (Brace); Woodland Peace (Favilla); Fantasia on Melodies of Strauss; Signature Tune, Come Back to Erin. 12.5 a.m. (Wednesday), Late News Bulletin in English. 12.40 (approx.), Club Concert for New Forest Listeners. The day you came along (Coslow); Symphony of the Breeze (Leon); Laughing Waltz; Swiny little thingy (Green); Solitario (Burl); Happy Ending (Par-Davies); A Couple of Fools in Love (Valentine); A little Street where old Friends Meet (Kalm); The Monkey on a String (Tucker); Old Man Blues (Ellington); Making Conversation (Rite); Dear Stranger (Hansen); Hand in Hand. 1.0, Time Signal. 1.1, Mandoline Band. The Blue Danube (Joh. Strauss); Tesoro mio (Beuceri); Mandolinata (de Pietro); Napolitana (Hay); Capriccio Mazurka (Arizono); In Old Seville (Ege); Mandoline (Thomé); La Czarine (Ganne). 1.30, Choral Music. Orchestral Moonlight on the Alster (Fetras); Old Man River (Kern); The Rogue Song; Passing by; Selection from Die Fledermaus (Joh. Strauss); Come to the Fair (Easthope-Martin); Nellie Gray (Slater); Orches-

ATHLONE

725 kc/s, 413 metres; 60 kW. Relayed by Dublin, 1,382 kc/s, 217 metres; and Cork, 1,337 kc/s, 224.4 metres.—1.30 p.m., News and Records. 2.0, Records. 6.0, For Children. 6.45, News. 7.0, Gardening Talk. 7.15, Literary and Dramatic Talk. 7.30, Time. 7.31, Concert by the Station Orchestra. 8.0, Mezzo-Soprano Solos by Gertrude Mortimer. 8.15, A Play by Elizabeth Young and Company. 8.45, Concert by the Station Orchestra. 9.0, Baritone Solos by John F. Walsh. 9.15, Pianoforte Solos by D. French Mullen. 9.30 to 10.30, Programme by the I.B.C. (Ireland), Ltd. 9.30, Special Request Programme. Signature Time. Young and Healthy; Trouble in Paradise; Selection from The Maid of the Mountains (Fraser Simpson); Largo (Handel); Les Cloches de St. Malo (Rimner); Maire my Girl (Caset); The Last Round Up; The Shadow Waltz; Selection from The Desert Song (Romberg); Signature Time, Young and Healthy. 10.0, Dance Music. Can't we meet again; Honey-moon Hotel; You ought to see Sally on Sunday; Racing Commentary; Trouble in Paradise; Yvonne; Shanghai Lil; It isn't fair. 10.30, I.B.C. Good-night Melody, followed by News. 10.40, Irish Music.

BARCELONA

EAJ1, 861 kc/s, 348.4 metres; 8 kW.—7.15 a.m., Radio Journal and Gramophone Music. 8.0, Chimes, Physical Culture and Gramophone Music. 8.20, Radio Journal and Gramophone Music. 9.0, Announcements. 11.0, Chimes and Weather. 12.0 Noon, Programme for Women. 12.45 p.m., Gramophone Music. 1.0, Gramophone Concert. 1.30, Theatre Notes and Gramophone Concert (cont'd.). 2.0, Sextet Concert. In the interval: Talk. 3.0, Programme for Hospitals, Gramophone Records. 4.0, Interval. 6.0, Trio Concert: Turkish March from The Ruins of Athens (Beethoven); Jeux (Denaret); Prelude, Op. 28, No. 17 (Chopin); Selection from Philemon et Baucis (Gounod); Dance (Michel); Canonetta (Hammer); Selection from Carmen (Bizet). 7.0, Request Gramophone Records. 7.30, Exchange and Gramophone Records (cont'd.). 8.0, Gramophone Music. 8.30, Educational Programme and News. 9.0, Chimes and Weather. 9.5, Announcements. Exchange, Market Prices, and Messages to Seamen. 9.10, Concert by the Radio Orchestra. Vicente Diez de Tejada reads from his own Works. 10.30, Song Recital by Antonio Sanchez Soriano (Baritone). 11.0, News. 11.10 (approx.), Dance Music, relayed from the Casa Llibre.

BARI

1,112 kc/s, 269.8 metres; 20 kW.—6.45 a.m., See Milan Vigentino. 11.30, Quintet Concert. 12 Noon, See Milan Vigentino. 7.0 to 7.15, News in Albanian. 7.30 till Close Down, See Milan Vigentino.

BASLE.—See Schweizerischer Landessender.

BERLIN

DEUTSCHLANDSENDER (REICHSENDER), 183.5 kc/s, 1,635 metres; 60 kW.—9.0 a.m., News. 9.10, Song, Pianoforte and Violin Recital by Nora v. Raubenheimer-Garczynska, Kurt Borack and Lothar von Ritterhof. 10.15, Weather. 10.30, Records. 11.0, Weather. 11.5, Records (cont'd.): March, Treu deutsch; Waltz (Delibes); Dances from Aida (Verdi); Finlandia (Sibelius); Sailors' Chorus from The Flying Dutchman (Wagner); Prelude (Rachmaninov); La capriciosa (Ries); Hungarian Rhapsody No. 1 (Liszt); Hungarian Dance (Brahms); Hoch-und-Deutschmeister-Marsch. After the Concert, Weather. 11.55, Time. 12.45 p.m., News. 1.0, Records. 2.0, For Girls. 2.30, Weather, Exchange. 2.45, Reading of a Scandinavian Christmas Story. 3.0, See Munich. 4.0, Yuletide Festivities—Play (Johann von Leers). 4.30, Pianoforte recital by Luise Greiner: The Waldstein Sonata, Op. 53 (Beethoven); Kinderszenen (Schumann). 5.0, Poems. 5.5, Radio Report from the Exhibition of the East German Provinces. 5.20, A Winter's Journey. 5.45, Weather. News. 6.0, Transmission for all German Stations, relayed from Breslau. 7.0, To-day's Motto. 7.1, Military Band Concert, conducted by Ahlers; Part I: Observier-Marsch (Teike); Modern Comedy Overture (Theil); Three Songs (Lassen): (a) Ich wandle unter Blumen, (b) Ich hatte einst ein schönes Vaterland, (c) Mit deinen blauen Augen; Suite from Sylvia (Delibes); Waltz, An der Elbe (Joh. Strauss); Part II: Military Marches. In the interval, Topical Talk. 9.0, News. 9.25, Report: 1933 on the Tiff. 9.45, Weather. 10.0) Concert, from Breslau.

BERLIN

FUNKSTUNDE, 716 kc/s, 419 metres; 1.5 kW. Relayed by Zeesen, DJC, DJA, DJD, DJB and DJE.—9.0 a.m., News. 9.10, Economic Report. 10.25, Exchange. 10.30, See Hamburg. In the interval, Weather. 12 Noon, Künneke Music on Records: Selection from Liselott: Song from The Cousin from Nowhere; Selection from Der Teufel der Herzogin. 12.20 p.m., See Hamburg. 1.15, News. 1.35, Records: Caprice Italien (Tchaikovsky); Spanish Caprice (Rimsky-Korsakov). 2.0, Exchange. 2.20, For Young People. 3.0, See Heilsberg. 4.0, See Hamburg. 5.0, Discussion on Reznicek's Opera, Donna Diana; Erich Kleiber, Julius Kapp and the Composer's Daughter at the Microphone. 5.30, The

FRIDAY
DECEMBER THE TWENTY-NINTH

Funkstunde informs its Listeners. . . 5.35, An Evening in the Mountains. 6.0, Transmission for all German Stations, relayed from Breslau. 7.5 to 9.0, See Heilsberg. 9.0, News. 9.30, See Heilsberg.

BERNE.—See Schweizerischer Landessender.

BEROMUNSTER.— See Schweizerischer Landessender.

BODEN.—See Stockholm.

BODO.—See Oslo.

BRATISLAVA

1,073 kc/s, 279.5 metres; 11 kW.—10.5 a.m., Records. 10.55, See Prague. 11.0, Agricultural Talk. 11.10, See Prague. 11.35, See Brno. 12.35 p.m., See Prague. 12.45, News in Slovak, German and Hungarian. 12.55, See Prague. 2.50, See Prague. 3.0, See Moravsko-Ostrava. 3.55, Sports Notes. 4.5, See Prague. 5.5, Pianoforte Recital by Földesy-Hermanova: Sonata in D (Antonio Soler); Sonata in C minor (Cantales); Two Spanish Dances (Granados); Prelude in B minor (Szymanowski); Melody (Rachmaninov); Minuet in G (Suk); Tango (Haba). 5.40, Telegraphy Lesson. 5.55, Hints for Housewives. 6.0, See Prague. 6.10, Educational Talk. 6.25, Recital of Modern Slovak Songs.

BREMEN.—See Hamburg.

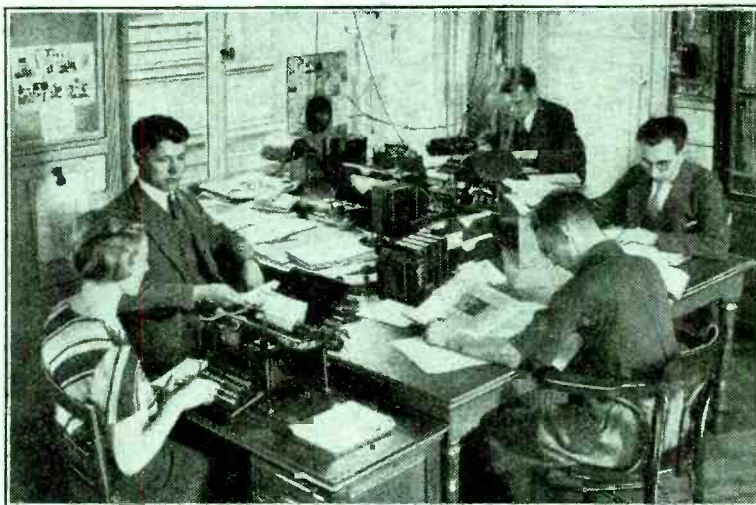
BRESLAU

923 kc/s, 325 metres; 60 kW. Relayed by Gleiwitz, 1,185 kc/s, 253.1 metres.—8.0

tra, conducted by Leemans.—1.0 p.m., Le Journal Parlé. 1.10, Concert of Waltzes by the Station Orchestra. 5.0, Concert by the Radio Orchestra, conducted by André March, Le salut du marin (Harras); A Journey in the Tyrol (Eilenberg); Prije à l'avant matin (De Ceunick); Tango (Fischer); Waltz (Rust); Homorous Scenes (Leonard); En Sourdine (Crabbé); The Clock and the Porcelain Figures (Ketelbey); Marche ténébre d'un Hanetton (Dubois); Music from Cypalisse et le Chèvre-pied (Pierne); Escales (Ibert); Hungarian Dances (Brahms). 6.0, Legal Talk. 6.15, Records. 6.30, Variety Programme: Sketch. 6.45, Pianoforte Recital by Marguerite Melin: Gavotte and Variations (Rameau); Romance sans paroles (Marg. Melin); Impromptu in F Minor (Pauré); Jeux d'eau (Ravel); Impromptu (Marg. Melin). 7.15, Talk on Aviation. 7.30, Legal and Literary Notes. 8.0, Concert by the Station Orchestra, conducted by Neulemans; Soloist, Mlle. Lairac (Songs); Overture, Benvenuto Cellini (Berlioz); Songs with Orchestra: (a) Air from Circe (Handel), (b) Nocturne (Franck); Three Pieces from The Damnation of Faust (Berlioz); Ballet music from Troyens a Carthage (Berlioz); Carnaval romain (Berlioz). 8.45, Talk: Electric Lighting in the Car. 9.0, Jazz Music by Nic Warner's Band. 10.0, Journal Parlé. 10.10, La Brabançonne.

BRUSSELS (No. 2)

N.I.R., 888 kc/s, 337.8 metres; 15 kW.—12.0 Noon, Giordano Concert on Gramophone



THE SPOKEN JOURNAL. The staff at Brussels No. 1 photographed at a busy moment while preparing the evening news bulletin.

a.m., Gym for Women. 8.20, Time, News. 10.40, Time, Weather. 11.0, See Munich. 12.15 p.m., See Leipzig. 1.15, Time, Weather. 1.20, Post Office Programme with Records. 1.50, Announcements. 2.20, Book Criticism: Helmuth Brückner (Jakubasch); 2.30, For Young People. 3.0, See Munich. 3.10, Agricultural Prices and Talk. 5.30, Political Talk. 5.45, Announcements. 5.50, Transmission for all German Stations: Folk at Work—Radio Report from the Mines and Factories of Silesia. 7.0, See Leipzig. 9.20, News. 9.35, The Gustav Gottschalk Orchestra, relayed from the Café Vaterland.

BRNO

878 kc/s, 342 metres; 35 kW.—10.0 a.m., Gramophone Records. 10.55, See Prague. 11.0, Agricultural Report. 11.10, See Prague. 11.35, Concert by the Station Orchestra, conducted by Bakala. 12.35 p.m., See Prague. 1.0, Market Prices. 2.30, See Prague. 2.40, Talk. 2.50, See Prague. 3.0, See Moravsko-Ostrava. 3.55, Talk on Winter Sports. 4.5, See Prague. 5.5, Talk on Art. 5.15, Talk for Workers. 5.25, German Transmission: News, Sports Notes, Talk: Birds in Winter, and Theatre Notes. 6.0, See Prague. 6.25, See Bratislava. 6.50, See Prague. 7.5, The Musical Instruments rebel—Radio Play. 8.0, Musical Programme. 8.15, Concert by the Station Orchestra, conducted by Janota. Soloists: Synkova and Synek (Songs). Overture, The Piper of Strakonice (Hrimaly); Intermezzo (Sebor); Song (Bendl); Duet from Leila (Bendl); Serenade (Kaän); Furiant (Malát); Aria and Duet (Paukner); Czech Dances (Rihovsky). 9.0, See Prague.

BRUSSELS (No. 1)

N.I.R., 589 kc/s, 509.2 metres; 15 kW.—12.0 Noon, Concert by the Small Station Orches-

Records: Acts One and Two of Fedora; Cena della Pasqua from Siberia. 1.0 p.m., Le Journal Parlé. 1.10, Concert by the Small Station Orchestra, conducted by Leemans. 5.0, Tchaikovsky Concert by the Symphony Orchestra, conducted by Arthur Meulemans: Overture, 1812; Allegro con gracia from the Pathetic Symphony; Italian Caprice; Suite from the Nutcracker Ballet. 6.0, Gramophone Concert: Selection from Follow a Star (Yellen); Polka, The Canary and the Frog; Selection from Rigoletto (Verdi); Hofballtänze (Lammer); Quadrille from Ophéus in the Underworld (Offenbach). 6.30, Concert by the Small Station Orchestra, conducted by Leemans. 7.30, Wireless Notes. 8.0, Concert by the Radio Orchestra, conducted by André Sylvan Scenes (Fletcher); Xylophone Solo, Schön Rosmarin (Kreiser); Conte pastoral (Godard); Conte amusant (Godard); Waltz (de Sévraec); Woodland Sketches (MacDowell). 8.30, Kampf ums Matterhorn—Radio Play (Jushara), translated by De Myneck. 9.30, Concert by the Symphony Orchestra, conducted by Arthur Meulemans: Chasse fantastique (Guiraud); Danse macabre (Saint Saëns); Bourrée fantasque (Chabrier). 10.0, Journal Parlé.

BUCHAREST

760 kc/s, 394.7 metres; 12 kW.—11.0 a.m., Exchange and Gramophone Records. 12.0 Noon, Radio Journal. 12.15 p.m., Gramophone Records. 4.0, Concert by the Station Orchestra: Overture, William Tell (Rossini); Rocco Suite for String Orchestra (Masson); Waltz, España (Waldteufel); Selection from Tosca (Puccini); Romance (Nottara). 5.0, Radio Journal. 5.15, Orchestral Concert (cont'd.): Intermezzo No. 1 from The Jewels of the Madonna (Wolf-Ferrari); Idyll (Stefanesco); Molly on the Shore (Grainger);

Selection from The Gipsy Baron (Strauss); March (Suk). 6.0, Educational Talk. 6.20, Gramophone Records. 6.45, Talk. 7.0, Symphonic Concert by the Philharmonic Orchestra, conducted by Alessandro, relayed from the Athenaeum. 7.50, Reading. 8.5, Concert (cont'd.). 8.45, Radio Journal.

BUDAPEST

545 kc/s, 550.5 metres; 120 kW. Also relayed on 840 metres from 6.25 p.m. till Close Down.—11.5 a.m., Concert. 12.30 p.m., The Berezi Rác Cigány Band. 2.30, For Children. 3.0, The Red Cross Movement. 4.0, Talk. 4.30, The Mandits Orchestra. 5.10, Shorthand. 5.40, Concert. 6.10, Political Review. 6.25, Records. 7.10, Dialogue. 7.50, Operetta Concert by the Concert Orchestra, conducted by Polgar. Soloists: Ibolya Darvas and Nikolaus Szedó (Songs). 9.15, News. 9.35, The Eugen Pertis Cigány Band from the Restaurant Royal.

CASSEL.—See Frankfurt.

COPENHAGEN

1,067 kc/s, 281 metres; 0.75 kW. Relayed by Kalundborg, 260 kc/s, 1,153.8 metres; and Skamleback OXY on 31.51 metres.—10.0 a.m., Weather. 10.10, Market Prices. 10.15, Broadcast for Schools. 11.0, Time and Chimes from the Town Hall. 11.5, The Harald Andersen String Ensemble, relayed from the Hotel d'Angleterre. 2.0 p.m., Danish Music by the Radio Orchestra, conducted by Emil Reesen. 2.50, Reading. 3.10 (approx.), Concert (cont'd.): Oriental March from Aladdin (Agernap); Suite of Scandinavian Folk Music; Suite, In the Alhambra (Lange-Müller); Danish Rhapsody, Himmerland (Reesen). 4.0, Programme for Children. 4.30, Market Prices. 5.0, Time and Chimes from the Town Hall. 5.5, Song Recital by Hallander Hellemann, with Commentary. 5.45, Weather. 5.54, Announcements. 6.0, News. 6.15, Time Signal. 6.30, Talk: 1933 Trade. 7.0, Chimes from the Town Hall. 7.2, Household Talk. 7.15, Suite, Aus Holbergs Zeit (Grieg); by the Radio String Orchestra, conducted by Reesen. 7.45, Reading. 8.0, A Microphone Visit to Denmark's Smallest Assembly Hall. 8.45, Harpsichord Solos: Prelude, Courante, Sarabande and Gigue from the English Suite No. 2 in A minor (Bach). 9.0, News. 9.15, French Music by the Radio Orchestra, conducted by Emil Reesen: Overture, Le roi d'Ys (Lalo); Extracts from The Nursery Suite (Inghelbrecht); Suite from Izevl (Piarna); Rhapsody on Folk Melodies (Gaubert); Carnival from the Roma Suite (Bizet). 10.0, Dance Music, relayed from the National Scala. 11.0, Time and Chimes from the Town Hall.

CORK.—See Athlone.

DANZIG.—See Heilsberg.

DRESDEN.—See Leipzig.

FECAMP

1,328 kc/s, 225.9 metres; 10 kW.—11.0 a.m. to 12 Noon, Programme in English by the I.B.C. Variety Programme. Part I: Light Music; Part II: Dance Music. 12 Noon, Programme in French. 3.30 p.m. to 6.0 p.m., Programme in English by the I.B.C. 3.30, Concert for Bourne-mouth and Weymouth Listeners: Part I: Accordion Music; Part II: Dance Music. 4.30, I.B.C. Nursery Corner: Birthday Greetings. 5.0, Concert for Southampton and Winchester Listeners. 6.0, Programme in French. 10.0 till Close Down, Programme in English, by the I.B.C. 10.0, Dance Music by Guy Lombardo and his Royal Canadians (Electrical Transcriptions); Goofoo (King); Stay out of my Dreams (Washington); Waltzing in a Dream (Young); Morning, Noon and Night (Swanström); Vilja's Song from 'The Merry Widow' (Lehár); Sweetheart Darlin' (Kahn); I wake up smiling (Ahlert); Don't blame me (Fields). 10.30, Light Music: Parade of the Tin Soldiers (Jessel); It's not a Secret any more (Blue); Ça c'est Paris (Padilla); Selection from The Pirates of Penzance (Sullivan); Wood Nymphs (Coates); A Life on the Ocean (Binding); Isn't this a Night for Love (Burton); March, The Standard of St. George (Alford). 11.0, Talkie Time: Times from the Talkies and Shows. Signature Tune: Sittin' in the Dark; How could we be wrong? (Potter); But for you (Holländer); In a Year, in a Day (Heymann); Black Moonlight (Coslow); Signature Tune: Sittin' in the Dark. 11.15, Concert: Without that certain thing (Nesbitt); It's the Talk of the Town (Sykes); But for you (Holländer); The Last Round-up (Hill). 11.30, I.B.C. Time Signal. 11.31, Club Concert for Busington Listeners. Part I: Orchestral Concert: Blossoms from Mozart's Garden; Song without Words (Tchaikovsky); Flower Song from Carmen (Bizet); Morning (Grieg); Liebestraum (Liszt); Black Eyes (Ferraris); Old Spanish Song (Anbert); Music of the Spheres (Joh. Strauss). 12.5, a.m. (Saturday), Late News Bulletin in English. 12.10 (approx.), Club Concert. Part II: The Last Round-up (Russell); See me Dance the Polka; There's a New Day comin' (Young); I bring a Song (Young); My Hat's on the Side of my Head (Woods). 12.30, Dance Music: Signature Tune: The Bells of Normandy; Buckin' the Wind; Mood Indigo; A Couple of Pals; The Gold Diggers' Song; Laughing Waltz; I'm getting

Sentimental over you; Everyone loves my Marguerite; Adios, Good-bye. 1.0, I.B.C. Time Signal. 1.1, Dance Music. 2.0, I.S.C. Goodnight Melody and Close Down.
FLensburg.—See Hamburg.
FLORENCE.—See Turin.

FRANKFURT

1,157 kc/s, 259.3 metres; 17 kW. Relayed by Cassel and Trier, 1,157 kc/s, 259.3 metres.—9.0 a.m., News. 10.0, Concert. 10.40, Announcements. 11.0, See Langenberg. 12.15 p.m., Time and News. 12.25, News. 12.35, See Stuttgart. 1.40, For Women. 2.30, Weather. 2.40, Time and Economic Notes. 3.0 to 5.35, See Langenberg. 5.35, Talk: Industrial Revival in Hesse. 5.50, News. 6.0, Transmission for all German stations, relayed from Breslau. 7.0, Topical Talk. 7.10, Le domino noir—Opera (Auber), arranged for Radio by Hans Rosbaud. 8.40, Radio Report from an Agricultural College. 9.0, Time and News. 9.23, See Stuttgart. 9.30, News. 9.45 to 11.0, See Langenberg. 11.0, Talk: Fateful meetings of Great Germans.
FREDRIKSSTAD.—See Oslo.
FREIBURG.—See Stuttgart.
GENEVA.—See Radio-Suisse Romande.
GENOA.—See Turin.
GLEIWITZ.—See Breslau.
GOTEBORG.—See Stockholm.
GRAZ.—See Vienna.
HAMAR.—See Oslo.

HAMBURG

806 kc/s, 372 metres; 1.5 kW. Relayed by Bremen, 1,112 kc/s, 269.8 metres; Flensburg and Hanover, 1,319 kc/s, 227.4 metres; and Kiel, 1,292 kc/s, 232.2 metres.—9.0 a.m., Records. 9.50, News. 10.0, Records. Overtures to Il Seraglio (Mozart), The Barber of Seville (Rossini), The Hermit's Bell (Mallart), Light Cavalry (Suppe). 10.30 (from Bremen), Concert, conducted by Fredo Niemann, relayed from the Old Rathaus. Florentine March (Fucik); Overture, Semiramis (Rossini); Waltz, Wir sind heute so vergnügt (Meisel); Russian Intermezzo (Franke); Introduction to Act III and Bridal Chorus from Lohengrin (Wagner); Selection from Preciosa (Weber); Boccaccio Quadrille (Strauss); German March (Keil); Mazurka, La Czarine (Ganne); Mussinan March (Carl). In the intervals, Programme for Women, Time and News. 12 Noon, Exchange. 12.10 p.m., Weather. 12.20, Light Music. 1.15, News. 1.35, Songs on Records. Frisch gesungen (Slicher); Es wollt' ein Magdlein früh aufstehn; Das Wandern ist des Müllers Lust (Zonner); Folk Song. Es ritten drei Ritter zum Tore hinaus; Heideroselein (Werner); Am Brunnen vor dem Tore (Schubert); Vom Bauer und den Tauben (Taubert); Ewig liebe Heimat (Bren). 2.0, Exchange. News. 3.0, See Heilsberg. 4.0, The Station Male Voice Quartet and Women's Choir and Soloists. 5.0, Talk: Reasons for the Decline of Races. 5.30, Records. Fantasia on the Song, Die Warnung (Löhrl); Pour un baisier (Fosti); Waltz, Weaner Madl'n (Ziehler). 5.40, Exchange. 5.50, Weather. 6.0, Transmission for all German Stations, relayed from Breslau. 7.5 to 9.0, See Heilsberg. 9.0, News. 9.30, Concert from Heilsberg.
HANOVER.—See Hamburg.

HEILSBURG

1,085 kc/s, 276.5 metres; 60 kW. Relayed by Danzig, 671 kc/s, 447.1 metres.—10.30 a.m., See Hamburg. 12.5 p.m., Records. Part I. Famous Singers, Lucrezia Bori: (a) Clave itos (Valverde), (b) Malaguena (Paganini); La Casazza; Aria from La Favorita (Donizetti); Hilde Cravena: (a) Desdemona's Prayer from Othello (Verdi), (b) Weidenbaum; Galli-Curci: Cantata (Scarlatti). Part II. Caruso Records. Hantise d'amour (Szule); Ingenioso Requin (Verdi); Garibaldi Hymn (Mercantini); Cuius animam (Rossini); Two Pieces (Caruso): (a) Alte Zeiten, (b) Serenata. Part III. Spanish Music. Festival at Seville (Albeniz); Overture, The Secret Marriage (Cimaron); Air from La Vida breve (Fallá); In the intervals, News. 1.30, Post Office Programme with Records. 2.0, Exchange. 2.15, For Children. 2.35, For Women. 3.0, The Small Station Orchestra, conducted by Eugen Wilken. Overture, Raymond (Thomas); Selection from The Queen of Spades (Tchaikovsky); Overture, Der Bettelstudent (Müllner); Rhapsody in A minor (Dvorák). 4.0, See Hamburg. 5.0, Book Review. 5.15, Agricultural Prices and Ice Report. 5.25, Agricultural Talk. 5.50, Weather. 6.0, Transmission for all German Stations, relayed from Breslau. 7.0, News. 7.5, Twenty-Five Years of Popular Melodies—Radio Sequence (Martin Borrnann), with Music by the Station Orchestra. 8.5, Symphony in C Op. 7 (Schubert) by the Königsberg Opera House Orchestra, conducted by Brückner. 9.0, News. 9.30 (from Danzig), The Municipal Theatre Orchestra, conducted by Ernst Kallipke. Overture, Hans Sachs (Lortzing); Barcarolle, Auf Capri (Blon); Ballet Suite (Lehár); Dorfkind-Walzer (Kálmán); Selection from Suzanna's Secret (Wolf-Ferrari); Caucasian Suite (Ivanov); Overture, Die Weiber von Weinsberg (Conrad).

DEC. 29th

FRIDAY

continued

HILVERSUM

1,013 kc/s, 296.1 metres; 7 kW. up to 5.40 p.m. and 20 kW. from 5.40 p.m.—7.40 a.m., Programme of the Workers' Radio Society (V.A.R.A.). Records. 9.40, Religious Programme of the Liberal Protestant Radio Society (V.P.R.O.). 9.55 to 11.40, V.A.R.A. Programme. 9.55, Recitations. 16.10, Records. 10.40, Gastronomic Talk. 11.10, Organ Recital by Jolau Jong. 11.40 to 3.40 p.m., Programme of the General Broadcasting Society. 11.40 a.m., Kovacs Lajos and his Orchestra, with Gramophone Interludes. 1.55 p.m., Records. 2.10, Reading. 2.40, Records. 3.40 till Close Down, V.A.R.A. Programme. 3.40, Records. 5.10, The V.A.R.A. Orchestra, conducted by Hugo de Groot. 6.0, Records. 6.10, The V.A.R.A. Orchestra (cont.). 6.40, Temperance Talk. 7.0, The V.A.R.A. Orchestra (cont.): Extract from Old Dutch Suite (Popper); Piece (Morks-Diepenbeek); Song Potpourri (de Groot). 7.40 to 10.40, V.P.R.O. Programme. 7.40, String Quartet in A Minor, Op. 41, No. 1 (Schumann), by the Haydn Quartet. 8.10, Radio Play with Music. 9.25, String Quartet in G Minor, Op. 10 (Debussy) by the Haydn Quartet. 9.55, Religious News. 10.0, News. 10.10, Records. 10.40 till Close Down, V.A.R.A. Programme; Records.
HORBY.—See Stockholm.

HUIZEN

160 kc/s, 1,875 metres; 7 kW. until 3.30 p.m. Transmitted from Kootwijk ou 50 kW. from 3.40 p.m. Programme of the Catholic Radio Society (K.R.O.). 7.40 a.m., Records. 8.55, Interval. 9.40, Records. 11.10, For Hospitals. 11.40, Police Notes. 11.55, Concert by the K.R.O. Sextet. 12.55 p.m., Sextet Concert (cont.): Swedish Songs and Dances (Pagel); Waltz, Morgenblätter (Joh. Strauss); Das Blumenmädchen von Neapel (Fresco); Finale. 1.25, Organ Recital (cont.). 1.55, Records. 2.40, Violin Recital by Els Berentzen; Romance (Wilhelmi); Andante (Tchaikovsky); Hungarian Poem (Hubay); Canzonetta (Godard); Records: Rondino (Kreisler); La cinquante (Gabriel Marie); German Dance (Mozart); Andade (d'Ambrosio). 3.25, Records. 3.40, Interval. 3.55, Records. 4.10, Violin Sonata Op. 35 (Pierne). 4.40, Gardening Talk. 5.10, Radio Report from a Hospital in Arnhem. 6.10, Sonata (Franek). 6.40, Police Notes. 6.55, Records. 7.5, Talk. 7.25, Records. 8.10, News. 8.15, Concert by the K.R.O. Orchestra, conducted by Geritens. Soloist: Hermann Sehey (Baritone). 9.5, Records. 9.25, Wolf Recital by Sehey (Baritone): Auf einer Wanderung; Denk es, or Seele! Der Tambour; Er ist's. 9.40, The K.R.O. Orchestra: Overture in C (Schubert); Hymne an die Liebe (Reger); Italian Serenade (Wolf). 10.10, News. 10.15, The K.R.O. Orchestra. 10.40, Records. 10.55, The K.R.O. Boys, conducted by Lustenhouwer.

INNSBRUCK.—See Vienna.
KALUNDBORG.—See Copenhagen.
KIEL.—See Hamburg.
KLAGENFURT.—See Vienna.
KOSICE.—See Prague.

LANGENBERG

635 kc/s, 473 metres; 60 kW.—10.10 a.m., Gramophone Records. 10.25, Sponsored Programme with Records. 10.55, Weather. 11.0, Gramophone Records. 12.15 p.m., See Frankfurt. 12.25, News. 12.35, See Stuttgart. 2.0, Talk: The Position of Domestic Servants. 2.20, Records. 2.30, Exchange. 2.50, Political Announcements. 3.0, The Station Chamber Choir and Soloists. Violin and Bandion: March; Women's Choir: Winterlied; Soprano and Pianoforte: Mutterwarnung; Violin, Bandion and Male Voice Choir: Gesundheit, Herr Nachbar; Bandion and Violin: Rheinländer; Soprano and Pianoforte: Spatz und Katze; Choir: Winterabend; Soprano and Pianoforte: Das Schneeglöckchen; Es ging ein Mädchen; Bandion and Violin: Waltz and Kirmeslied; Male Voice Choir: Litzows wilde Jagd; Soprano, Violin and Pianoforte: Am See; Bandion and Violin: Polka; Eier-Gretel Soprano and Pianoforte: Gute Nacht; Male Voice Choir: Zum Tagesbefehl. 3.45, The Fröhliche Fünf: Waltz from Das Fürstentind (Lehár); Gavotte, Rendezvous (Aletter); Extase (Ganne); Zigeunerlied (Boldi); Violin Solo: Souvenir (Drda); Fascinata (Murzilli). 4.15, Pianoforte Trio in B flat, Op. 29 (Schubert), by Walter Schneiderhan (Violin), August Schreiber (Cello) and Egbert Grape (Pianoforte). 5.0, English Conversation Lesson. 5.20, Talk on Genealogy. 5.35, Talk: Germanic Beliefs and Customs at Christmas Time. 5.45, Announcements. 6.0, Transmission for all German Stations, relayed from Breslau. 7.0 to 9.20, See Frankfurt. 9.20, See Stuttgart. 9.30, News. 9.40, The Coming Week's Events in West Germany. 9.45, Records. 10.0, Dance Music by the Station Dance

Band, the Fröhliche Fünf and Soloists. Conductor: Kühn. 11.0, See Frankfurt. 1.20 a.m. (Saturday) (only for Zeesen), The Feast of Fools.

LAUSANNE.—See Radio-Suisse Romande.

LEIPZIG

770 kc/s, 389.6 metres; 120 kW. Relayed by Dresden, 941 kc/s, 319 metres.—9.45 a.m., Post Office Programme with Records. 10.40, News. 11.0, Concert from Munich. 12.15 p.m., News, Time. 12.25, Records: Two Movements from Concerto grosso in D (Handel); Sonata in F (Loeillet); Der Hirt auf dem Felsen (Schubert); Adagio from the Violin Concerto in E (Bach); Movement from the Concerto in B minor (Vivaldi). 1.0, News. 1.20, Art Review. 1.30, Ernst Wiechert reads from his Book Der Fremde. 1.40, For Young People. 2.0, Mezzo-Soprano Recital by Gertrude Hepp: Three Songs (Werner Schubert): (a) Stilleinsamkeit, (b) Advent, (c) Abend am Meer; Jahreswende (Hohn); Weihnacht (Lauterlein); Zweier Seelen Lied (Müller); An die Kraft (Müller); Four Songs from Lieder aus meinem Garten (Kormann). 2.30, For Women. 2.45, Exchange. 3.0, See Munich. 4.30, Talk. 4.50, Baritone Recital by Max Hartmann: Heliopolis (Schubert); Abendlied (Schumann); Wenn ich mit Menschen und mit Engelszungen redete; Wächterlied auf der Wartburg (H. Wolf); Der Weckruf (Pfitzner). 5.10, Talk: The Querfurt Museum. 5.30, Reading. 5.45, Exchange, Weather, Time. 6.0, Transmission for all German Stations, relayed from Breslau. 7.0, News. 7.10, Humorous Programme. 7.30, The Leipzig Symphony Orchestra, conducted by Weisbach: Anton Rohden (Pianoforte); Romantic Overture, Op. 16 (Thuille); Pianoforte Concerto in A minor, Op. 54 (Schumann); Symphony No. 6 (Ambrosini). 9.0, News and Time. 9.20, News. 9.35, Serenade, relayed from Breslau. 11.0 (approx.), Close Down.

LINZ.—See Vienna.

LUXEMBOURG

252 kc/s, 1,191 metres; 200 kW. Dutch evening.—7.0 p.m., Gramophone Concert: Marche des petits Soldats de Plomb (Pierne); Symphonic Poem, Le fontane di Roma (Respighi); Suite No. 3 from Tsar Saltan (Rimsky-Korsakov). 7.30, Suite in the Old Style for Violin and Pianoforte (Rettich), by Ernest Eichel and Alexandre Zakin. 8.0, Dance Music. 8.30, Suite from Prometheus (Beethoven). 8.45, Exchange. 8.50, News in French. 9.0, Concert by the Station Orchestra, conducted by Pensis: Overture, Sakuntala (Goldmark); Rhapsody No. 6 (Liszt); Four Short Pieces (Dupuis); Lehár Potpourri (Hruby). 9.45, News in German. 9.55, Song Recital by Mariette Serlé. 10.25, Dance Music by the Radio Jazz Band, conducted by Ferry Jusa.

MADRID

ARANJUEZ (EAQ); 10,000 kc/s, 30 metres; 20 kW.—10.30 p.m., Guitar Recital of Two-Steps. 10.45, Radio Chronicle. 11.0, Musical and Literary Programme for Listeners in the Philippine Islands. 11.45, Light Music. 12.0 Midnight till Close Down, Programme in English by the I.B.C. 12.0 Midnight, Dance Music: Stay on the right side of the road; You're charming; Let's try again; Peter, Peter; Sweetheart Darlin'; Stay out of my dreams; Dinner at Eight; They didn't believe me; Margie; My Wishing Song; Don't Blame Me; Love is the thing; Blue Prelude; Once I fell in Love; It's time to sing "Sweet Adeline" again; Oh, Peter. 1.0 a.m., I.B.C. Goodnight Melody and Close Down.

MADRID

EAJ7, 707 kc/s, 424.3 metres; 2 kW.—2.0 p.m., Chimes, Time, Weather and Theatre Notes. 2.15 (approx.), Concert of Popular Music. In the interval, Exchange. 3.50, Radio Journal. 4.0 to 7.0, Interval. 7.0, Chimes, Exchange Announcements and Programme for Women. 8.15, Radio Journal. 8.30 to 9.30, Interval. 9.30, Chimes, Time and Radio Journal. 9.45 (approx.), Violin and Song Recital, in connection with the Music Competition, by Manuel Perez Dias and Jesus Freire (Baritone). Violin Solos: (a) Sarabande (Bach), (b) Variations on a Theme of Corelli (Tartini-Kreisler), (c) Ave Maria (Schubert-Wilhelmi), (d) Zizgane (Ravel), (e) Caprice No. 24 (Paganini-Auer), (f) Aragonese (Granados-Thibaud), (g) Jota Navarra (Sarasate). Baritone Solos: (a) Drinking Song (Moreno Torroba), (b) Luisa Fernanda (Moreno Torroba), (c) Song (Soro-zabel), (d) La tempestad (Chapi), (e) Prologue, from I Pagliacci (Leoncavallo), (f) Romance from La Traviata (Verdi), (g) Aria from Rigoletto (Verdi), (h) Cavatina from The Barber of Seville (Rossini). 11.45, Radio Journal and Announcements. 12.0 Midnight, Chimes and Close Down.
MALMO.—See Stockholm.

MILAN

VIGENTINO, 662 kc/s, 453.1 metres; 4 kW. Rome is not transmitting for this day but Milan (Vigentino) is giving the chief transmissions. Relayed by Naples, 941 kc/s, 319 metres; and 2R0, 11,810 kc/s, 25.4 metres.—11.30 a.m., Records. 12 Noon, Orchestral Concert: Sinfonietta veneziana (Principe); Nostalgia cubana (Vidale); Hungarian Dance No. 8 (Brahms); Se più non m'ami (Pignacca); Selection from Casa mia (Pietri); Conquita (Donati); Three Roses (Strecker); Gioventù (Bixio). 1.0 p.m., Time and Announcements. 3.0, Aufsteig und Fall der Stadt Mubagouny and Der Jasage—Two Operas (Kurt Weill), relayed from the St. Cecilia Academy. 5.0, Market Prices. 5.10, Announcements. 5.20, Agricultural Report in Spanish, German and French. 5.30, Religious Address. 5.55 (Naples), Shipping and Sports Notes. 6.0, News in Foreign Languages. 6.30, Records. 6.50, Giornale Radio. 7.0, Time, Announcements, and Records. 7.5, Records. 7.30, Review. 7.40, Choral Concert. In the interval, Humorous Talk. 8.30 (approx.), Vocal and Orchestral Concert; Conductors, Santarelli and Casolari; Lauda per la natività del Signore (Respighi); Extracts from Suor Angelica (Puccini); Extracts from Mephistopheles (Boito). 10.0, Giornale Radio.

MORAVSKA-OSTRAVA

1,137 kc/s, 263.8 metres; 11 kW.—5.15 a.m., Programme from Prague. 8.50, Programme from Prague. 10.0, Records. 10.55, See Prague. 11.0 Agricultural Talk. 11.10, See Prague. 11.35, See Brno. 12.35 p.m., See Prague. 2.30, See Prague. 2.40, Talk: Schools in Czechoslovakia. 2.50, See Prague. 3.0, The Station Orchestra, conducted by Plichta: Overture, The Kiss (Smetana); Suite (Bruscelmann); Czech Humoresque (Roob); Slovak Potpourri (Pia-kacek); Serenade (Leoncavallo); Polka (Kricka). 3.55, See Prague. 5.5, Tourist Report. 5.15, See Prague. 6.25, See Bratislava. 6.50, See Prague.

MOTALA.—See Stockholm.
MUHLACKER.—See Stuttgart.

MUNICH

716 kc/s, 419 metres; 60-100 kW. Relayed by Augsburg and Kaiserslautern, 536 kc/s, 560 metres; and Nürnberg, 1,256 kc/s, 239 metres.—10.30 a.m., Post Office Programme, with Records. 10.50, See Leipzig. 11.0, Concert, conducted by Erich Kloss. 12.15 p.m., See Leipzig. 12.25, Records: Bedouin March (Oscheit); Air from Das Veilchenmädle (Helmesberger); Waltzes (Chopin); Song, Old Heidelberg (Jensen); Die Berge, die sind meine Heimat (Birkhofer); Nola (Arndt); Frederic-Rex-Marsch (Rudeck). 1.0, See Leipzig. 1.10, News. 1.20 (from Nürnberg), Post Office Programme, with Records. 1.50, For Women. 2.30, Talk: Work in the Saar District. 2.50, Weather, Agricultural Notes. 3.0, Concert conducted by Erich Kloss: Selection from The Maid of Artois (Balfé); Minuet and Scherzo (Brahms); Selection from Lohengrin (Wagner); Carnival-Minuturas (Kaske); Cello Solo, Ständchen (Sitt); Minuet (Bolzoni); Kreisler Potpourri (Reznicek); Violin and Orchestra: Rondo (Mozart); Venetian Serenade, Auf der Lagune (Fucik). 4.30, Talk. 4.50 (from Nürnberg), Dance Suite on Folk Themes for Eight Wind Instruments (Rudolf-Herbst). 5.10, Journey through Angola (Dr. Paul Rohrbach). 5.30, Records. 5.45, Time, Announcements. 6.0, Transmission for all German Stations, relayed from Breslau. 7.0, See Leipzig. 9.20, News. 9.35, See Breslau.

NAPLES.—See Rome.
NOTODDEN.—See Oslo.

OSLO

277 kc/s, 1,083 metres; 60 kW. Relayed by Fredriksstad, 815 kc/s, 368.1 metres; Hamar, 522 kc/s, 574.7 metres; Notodden, 671 kc/s, 447.1 metres; Porsgrund, 662 kc/s, 453.1 metres; Rjukan, 671 kc/s, 447.1 metres; and Jeløy, LCL, 6,990 kc/s, 42.92 metres.—11.10 a.m., Exchange. 11.55, Time. 12.0 Noon to 1.0 p.m., Records. In the intervals, Weather, Agricultural Report, and Exchange. 3.30, Concert, relayed from the Britannia Hotel, Trondheim. 4.30, Theatre Talk. 5.0, A Comedy. 6.0, Announcements. 6.30, Cello Recital by Hermann Sandby: Andante from the Cello Concerto (Sandby); Sonata in A (Boccherini); Hungarian Rhapsody (Popper). 7.0, Time and Review of the Year. 7.30, Quintet Concert of Christmas Carols. 8.10, Reading. 8.30, Agricultural Report and News. 9.0, Topical Talk. 9.15, Concerto grosso in B for Two Violins, Cello, and Pianoforte (Corelli). 9.45 (approx.), Close Down.
OSTERSUND.—See Stockholm.

PALERMO

556 kc/s, 539.5 metres; 3 kW.—12 Noon to 1.0 p.m., Gramophone Records. In the interval, Talk and News. 4.30 to 5.30, Gramophone Records. 7.0, Announcements. 7.20, Gramophone Records. In the interval, Time and News. 7.45, Concert. In the interval, Confession before the Microphone. After the Concert, Records. 10.0, Giornale Radio.

PARIS

EIFFEL TOWER, Call FLE, 207.5 kc/s, 1,445.7 metres; 13 kW. Time Signals (on 2,650 metres) at 9.26 a.m. and 10.26 p.m. (Preliminary and 6-dot Signals).—12.30 p.m., Concert relayed from Paris (Ecole Supérieure), 671 kc/s, 447.1 metres. 1.0, Market Prices. 1.15, News. 1.30, Agricultural Talk. 1.45, Labour Report. 2.0, Exchange and Science Talk. 2.15, Economic Notes. 2.30, Market Prices. 2.45, Poetry. 3.0, News, Amusement Guide and Aviation Notes. 3.15, Exchange. 3.30, Exchange and Market Prices. 3.45, Report. 4.0, Tourist Report. 4.15, Exchange and Market Prices. 5.45, Le Journal Parlé. 7.15, Weather. 7.25, News. 7.30, Liszt Pianoforte Recital by Marie-Antoinette Pradier, with Commentary: Les Jeux d'eau à la Villa d'Este; Sonetto del Petrarca; Valse oubliée; Die Jagd; Death of Isolda (Wagner-Liszt). 8.0, Political Talk. 8.15, Station Symphony Orchestra, conducted by Flament: Miniature Suite (Coates); Ariette d'autrefois (Brussels); Double Bass Solo; Tenerezza (DeLune); Prelude, Imelda (Lainé); Violin Solo: Overture, Les Linottes (Mathé).

PARIS

POSTE PARISIEN, 914 kc/s, 328.2 metres; 60 kW.—7.10 a.m., Chimes and Gramophone Concert. In the intervals at 7.30, News. 8.0, Sponsored Concert. 8.20, News. 8.45, Talk for Housewives. 12.00 Noon, Financial News. 12.5 p.m., Song on Gramophone Records. 12.20, Gramophone Records. 1.5, Financial News. 1.15, Gramophone Records. 1.25, Financial Notes. 1.30, Gramophone Records. 2.0, Financial News. 3.15, Financial Notes and Exchange. 3.45, Financial Notes. 4.50, Financial News. 6.45, Market Prices. 6.52, Talk. 7.0, Gramophone Records. 7.7, Talk on Music. 7.15, Le Journal Parlé. 7.30, Song and Pianoforte Recital. 8.0, Arthur-Operetta in Three Acts (Christine). In the intervals at 8.20, Financial News. 10.10, News.

PARIS

RADIO-PARIS, Call CFR, 174 kc/s, 1,725 metres; 75 kW.—6.45 a.m., Gym. 7.30, Weather and Gym. 7.45, Records. 8.0, Weather and News. 12 Noon, Jewish Talk. 12.30 p.m., Records. In the interval, Exchange, News and Weather. 2.5, Announcements. 3.45, Exchange. 6.20, Weather, Agricultural Talk and Exchange. 6.45, Report of Social Assurance Societies. 7.0, Talk: The Post-War Novel. 7.20, Records: Il n'y a pas de raison (Yvain); Two Songs from Les Noces de Jeannette (Massé); Pan y Toros (Mateo); Les airs du Poilu (arr. Salabert); La légende des flots (Christine); Air (Hanley); Selection from An American in Paris (Gershwin); Roses d'amour (Sabatier). 7.50, News. 8.0, Readings. 8.30, News and Weather. 8.45, La Traviata—Opera (Verdi). In the interval, News.

PITTSBURGH

KDKA; 980 kc/s, 306 metres; 50 kW. Relayed by WXXK on 48.86 metres and 25.27 metres.—12.00 Noon, Musical Clock. 1.0 p.m., Morning Devotions, from New York. 1.15, Don Hall Trio, from New York. 1.30, Lew White, Organist, from New York. 2.0, Breakfast Club, from New York. 2.30, Style and Shopping Service. 2.45, News and Minute Manners. 3.0, Programme to be announced. 3.15, Clara, Lu 'n' Em, from New York. 3.30, To-day's Children, from New York. 3.45, Sammy Fuller. 4.0, Music Appreciation Hour, from New York. 5.0, Rosalie Wolf, Soprano, from New York. 5.15, Four Aces. 5.30, News and Market Reports. 5.45, Ernie Holst's Orchestra. 6.0, Farm and Home Hour, from New York. 6.30, Ernie Holst's Orchestra. 7.0, Request Programme. 7.30, KDKA Home Forum. 8.0, U.S. Marine Band, from New York. 9.0, Betty and Bob, from New York. 9.15, Utility Hall. 9.30, News and Market Report. 9.45, Orchestra, from New York. 10.0, Uncle Tom and Betty. 10.15, KDKA Kiddies' Klub. 10.30, The Singing Lady, from New York. 10.45, Orphan Annie, from New York. 11.0, News and Pat Haley. 11.15, Sports Notes and Programme Preview. 11.30, Egizi's Salon Orchestra. 11.45, Lowell Thomas, from New York. PORSGRUND.—See Oslo.

PRAGUE

614 kc/s, 488.6 metres; 120 kW.—9.10 a.m., Orchestral Concert: March (Kaiser); Song (Kubin); Selection from Die Puppenfee (Bayer); Foxtrot (Jezek); Intermezzo, Dance of the Butterflies (Leopold); Polka (Grossmann); Foxtrot (Silver); Melody (King); March (Fueck). 10.0, Records. 10.55, Agricultural Talk. 11.0, See Bratislava. 11.10, Records. 11.20, Weather. 11.25, News. 11.35, See Brno. 12.35 p.m., Talk for Workers. 12.45, Records. 12.55 to 1.0, Exchange and Weather. 2.30, Records. 2.40, Talk on Prague. 2.50, Weather and Exchange. 3.0, See Moravská-Ostrava. 3.55, Reading. 4.5, Concert by the Ondricek Quartet with Povolny (Clarinet): Clarinet

DEC. 29th

FRIDAY

continued

Quintet (Ridky); String Quartet in C. Op. 39 (Boccherini). 5.5, Agricultural Talk. 5.15, Talk for Workers. 5.25, News in German. 5.30, German Transmission: Talk: The Economic Crisis of 1933. 6.0, Time, News and Weather. 6.10, English Conversation Lesson. 6.25, See Bratislava. 6.50, Talk on Economics. 7.5, Recital of Drinking Songs by Kael Scharf. 7.30, Symphony Concert by the Czech Philharmonic Orchestra, conducted by Jirak: Pastoral Symphony No. 6, Op. 68 (Beethoven); Eine kleine Nachtmusik (Mozart); Waltz, Die Schönbrunner (Lanner); Polka, Hortensia (Hilmar); Polka (Smetana); Waltz, Frühlingsstimmen (Joh. Strauss). 9.0, Time, News and Sports Notes. 9.15, Russian News.

RADIO-SUISSE ROMANDE

SOTTENS, 743 kc/s, 403 metres; 25 kW.; and Geneva, 395 kc/s, 749.9 metres.—11.40 a.m. (from Geneva), Records. 12 Noon (from Geneva), Exchange. 12.10 p.m. (from Geneva), Records. 2.28, Time Signal from Neuchâtel Observatory. 3.0, See Schweizerischer Landessender. 5.0 (from Geneva), For Women. 5.30 (from Geneva), Esperanto Lesson. 5.40 (from Geneva), English Lesson. 6.5 (from Geneva), Bridge Lesson. 6.20 (from Geneva), Chess Lesson. 6.35 (from Geneva), Records. 6.59, Weather. 7.0 (from Lausanne), Pianoforte Recital by Lily Merminod: First Movement from the Sonata (Searlati); Sonata in D (Haydn); Spring Song (Mendelssohn); Au bord d'une source (Liszt). 7.30 (from Lausanne), Dramatic Programme. 8.0 (from Lausanne), Cabaret Concert. 9.0, News. 9.10 (from Lausanne), Dance Music.

REYKJAVIK

250 kc/s, 1,200 metres; 21 kW.—11.0 a.m., Weather. 1.15 p.m., Variety Programme. 4.0, Weather. 8.0, Musical Programme. 8.10, Weather. 8.20, Music and Announcements. 8.35, Reading. 9.0, Chimes and News. 9.30, Variety Programme.

RJUKAN.—See Oslo.

SALZBURG.—See Vienna.

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by W2XAF on 31.48 metres and by W2X on 19.56 metres.—7.30 p.m., Friday Steeplechase, from New York.

SCHWEIZERISCHER LANDESENDER

BEROMUNSTER, 653 kc/s, 459 metres; 60 kW.; Basle, 1,229 kc/s, 244.1 metres; and Berne, 1,220 kc/s, 245.9 metres.—11.0 a.m. (from Basle), Records. 11.29, Time Signal from Neuchâtel Observatory. Weather and News. 11.40 (from Basle), Records (contd.). 12.25 p.m. (from Basle), Time, Weather and Exchange. 12.30 to 2.30, Interval. 2.30 (from Zürich), Records. 2.59, Time Signal from Neuchâtel Observatory. 3.0 (from Zürich), Concert by the Beromünster Orchestra. 3.35, The Stocker Sepps Village Orchestra. 4.10, The Small Beromünster Orchestra, conducted by Scherbaum. 5.0 (from Zürich), For Children. 5.30 (from Berne), Talk: Los Angeles. 6.0 (from Berne), Time, Weather and Announcements. 6.20 (from Basle), Popular Programme. 7.30, The Beromünster Orchestra. 8.0, Weather and News. 8.10 (from Basle), Goldgräber (The Gold Digger)—Play (Rossi). 9.15 (approx.), Close Down.

SOTTENS.—See Radio-Suisse Romande.

STOCKHOLM

689 kc/s, 436 metres; 55 kW. Relayed by Boden, 242 kc/s, 1,239.5 metres; Göteborg, 932 kc/s, 322 metres; Hörby, 1,167 kc/s, 257 metres; Metala, 222.5 kc/s, 1,348 metres; Östersund, 402 kc/s, 746.2 metres and Sundsvall, 554 kc/s, 542 metres.—4.0 p.m., Weather. 4.5, For Children. 4.25, Concert relayed from Malmö, 1,301 kc/s, 230.6 metres: Erklängen zum Tanze die Geigen (Jessel); Selection from Rose Marie (Friml-Stohart); Irish Folk Melody (Grainger); Dance (Anderberg); Foxtrot, Young and Healthy (Warren). 5.0, Reading. 5.30, Accordion Music, relayed from Göteborg. 6.15, News and Weather. 6.30, Song Recital. 7.0, Talk, relayed from Uppsala, 662 kc/s, 453.1 metres. 7.30, Lisa Tunell (Songs) and Margit Alenius-Theorell (Harpischord); Une vierge pucelle (le Bègue); Dialogue du premier ton (Clérambault); Or dites nous Marie (d'Andrieu); Joseph est bien marié (Balbastre); Bergerettes (arr. Weckerlin); Harpischord Solos: (a) Nun komm der Heiden Heiland (Zachow), (b) Variations on Lassus uns das Kindlein wiegen (Murschhauser). 8.0, Literary Re-

view. 8.30, Violin Recital by Per Carlsten: Caprice viennois (Kreisler); Ständchen (Schubert-Elman); Humoresque (Dvorák-Wilhelmi); Guitar (Moszkowski-Sarasate). 9.0, Records.

STRASBOURG

869 kc/s, 345 metres; 11.5 kW.—10.30 a.m., Orchestral Concert, relayed from Bordeaux-Lafayette, 986 kc/s, 304 metres. 12.00 Noon, March Records. 12.45 p.m., News. 1.0, Time and Exchange. 1.5, Records. 4.45, Literary Talk: Verlaine in Prison. 5.0, Orchestral Concert, conducted by Roskam: Selection from The Count of Luxembourg (Lehár); Waltz, Eternelle ivresse (Ganne); Pianoforte Solo: Overture, L'Ambassadrice (Auber); La Fête du hameau (Gillet); Babilage (Gillet); Slav Rhapsody No. 2 (Friedemann); Selection from Der Lustige Krieg (Joh. Strauss). 6.0, Trio Music, relayed from Lille, 1,128.5 kc/s, 265.8 metres. 7.0, Talk in German. 7.15, Recitations. 7.30, Time and News. 7.45, Records. 8.0, News in German. 8.30, Les Contes de Perrault—A Fairy Opera (Fourdrain). In the interval at 9.30 (approx.), News.

STUTTGART

MUHLACKER, 563 kc/s, 533 metres; 100 kW. Relayed by Freiburg, 1,157 kc/s, 259.3 metres and 527 kc/s, (569 metres until January 16, 1934).—7.50 a.m., Post Office Concert. 9.0, See Frankfurt. 9.10, Organ Recital of Schumann Music by Wilhelm Locks, relayed from the Ufa Palast. 9.30, Records. 10.25, Post Office Concert. 10.55, Weather. 11.0, See Langenberg. 12.15 p.m., See Frankfurt. 12.25, News. 12.35, The Mario Iseglio Orchestra from the Hindenburgbau: March, Mein Regiment (Blankenburg); Waltz, Frühlingsstimmen (Joh. Strauss); Overture, Mignon (Thomas); Selection from Die Fledermaus (Joh. Strauss); Violin Solo: Ave Maria (Schubert-Wilhelmi); Serenade (Heykens); Goldlocks (Powell); Selection from Cavalleria rusticana (Mascagni); Japanese Carnival (de Basque). 3.0, See Langenberg. 5.35, Time, News. 5.45, Talk on Motoring. 6.0, Transmission for all German Stations, relayed from Breslau. 7.0 to 9.20, See Frankfurt. 9.20, Talk: Things you should know. 9.30, News. 9.45, See Langenberg. 11.0, See Frankfurt.

SUNDSVALL.—See Stockholm.

TOULOUSE

779 kc/s, 385 metres; 8 kW.—12 Noon, Airs from Operettas. 12.15 p.m., Popular Melodies. 12.30, News and Exchange. 12.45, Request Gramophone Music. 1.0, Announcements. 1.1, Opera Music: Dance of the Sylphs, from The Dama in Oberon (Weber); Selection from Il Trovatore (Verdi). 1.15, Sound Film Music. 1.30, Light Orchestral Music. 2.0, News and Exchange. 4.15, News and Exchange. 6.0, News. 6.15, Hunting Horn Music. 6.30, Tourist Talk. 6.45, Till Eulenspiegel's Merry Pranks (R. Strauss). 7.0, Medical Talk. 7.15, News and Exchange. 7.30, Music by an Argentine Orchestra. 7.45, Operetta Music: Airs from The Desert Song (Romberg). Encore cinquante centimes (Yvain). The Merry Widow (Lehar) and La Basoche (Messager). 8.0, Concert by the Viennese Orchestra. 8.30, Sound Film Music. 8.45, Instrumental Music: Erotica (Grieg); Ideale (Tosti); Badner Mäddn (Konczak); Melody (Weber). 9.0, Opera Music: Overture, The Barber of Seville (Rossini); Aria from La Dame blanche (Roldieu); Aria from La Bohème (Puccini); Chorus and March from Carmen (Bizet); Prayer from Rigoletto (Verdi); Chorus from Mirella (Gounod). 9.30, Popular Music: Amina (Lincke); Ronde villageoise (Chabrier); Minuet in G (Paderewsky). 9.45, Balalaika Music and Russian Songs. 10.0, Operetta Music. 10.15, North African News and Announcements. 10.30, Military Music. 10.45, Chansonnettes. 11.0, Orchestral Music: Lehar Potpourri (Hrubý); Selection from La princesse jaune (Saint-Saëns). 11.15, Dance Music. 12 Midnight, News and Announcements. 12.5 a.m. (Saturday), Cabaret Programme. 12.30 (approx.), Close Down.

TRIESTE

1,211 kc/s, 247.7 metres; 10 kW.—6.45 a.m. to 3.45 p.m., See Turin. 4.10 to 7.40, See Turin. 7.40, See Milan Vigentino. 8.20 till Close Down, See Turin.

TRONDHEIM.—See Oslo.

TURIN

1,096 kc/s, 273.7 metres; 7 kW. Relayed by Milan, 903 kc/s, 332.2 metres; and Florence, 598 kc/s, 501.6 metres.—6.45 a.m., Gym. 7.0,

Time and Announcements. 10.15, Orchestral Concert. 11.30, Records. 11.45, Giornale Radio. 12 Noon, Time and Announcements. 12.5 to 1.15 p.m., Programme to be announced. In the interval, Records and Exchange. 3.35, Giornale Radio. 3.45, Programme for Children. 4.10, Chamber Music. 4.55, Weather. 5.0, Announcements. 6.0, Time and News in Foreign Languages. 6.30, Records. 6.50, Announcements. 7.0, Records. 7.30, Announcements. 7.40, See Milan Vigentino. 8.20, Talk. 8.30, Programme to be announced. 9.0, Dance Music. 10.0, Giornale Radio.

VALENCIA

RADIO-VALENCIA; 1,121 kc/s, 267.6 metres; 0.7 kW.—1.0 a.m. (Saturday) till Close Down, Programme in English by the I.B.C. 1.0, Military Band Music: March from Tannhäuser (Wagner); By the Blue Hawaiian Waters (Ketelbey); Selection from The Three Musketeers (Friml); Valse triste (Sibelius); Christmas Melodies by the Fireside (Forbes); Humoresque (Dvorák); Ciegenlied (Brahms); War March of the Priests (Mendelssohn). 1.30, Instrumental Music: Selection from Carmen (Bizet); Hawaiian Hotel (Traditional); Selection from A Bedtime Story; The Buffoon (Curzon); Waltz, Kilima (Traditional); A Perfect Day (Bond); Sailor's Hornpipe; Manila Moon (Gaston). 2.0, I.B.C. Goodnight Melody and Close Down.

VATICAN CITY

15,120 kc/s, 19.84 metres; (Morning) and 5,969 kc/s, 50.26 metres (Evening); 10 kW.—10.0 to 10.15 a.m., Religious Information in German. 7.0 to 7.15 p.m., Religious Information in Italian.

VIENNA

580 kc/s, 517.2 metres; 100 kW. Relayed by Graz, 852 kc/s, 352.7 metres; Innsbruck, 1,058 kc/s, 283 metres; Klagenfurt, 662 kc/s, 453.1 metres; Linz, 1,220 kc/s, 245.9 metres; and Salzburg, 1,373 kc/s, 218.5 metres.—10.30 a.m., Concert by the Wiener Symphoniker, conducted by Josef Holzer. 10.55, Weather. 11.0, Concert (contd.). 12 Noon, Time, News. 12.10 p.m., Records: Karol Szreter: Hungarian Rhapsody No. 12 (Liszt); Josef Manowarda: Gehebt und Gesang Weylas (Wolf); Josef Szigeti and Bela Bartok: Hungarian Folk Songs (Bela Bartok); Berta Kirina: Two Arias from Turandot (Puccini); Alfred Grünfeld: Nocturne in A Flat, Op. 32 (Chopin); Pablo Casals: Berceuse de Jocelyn (Godard); Enrico Caruso: Aria from Martha (Flotow); Heinrich Schliussus: Caro mio ben (Giordano). 2.0, Time, News, Exchange. 2.15, Gym. 2.25, For Children. 2.50, Pianoforte Concerto in A Minor (Grieg), by Ignaz Friedmann (on Gramophone Records). 3.25, For Women. 3.50, Talk. 4.15, Soprano and Baritone Recital by Clarisse Stuckart and Paul Lorenz. 4.55, Tourist Talk. 5.10, Talk: The Joys of Winter at Galtür. 5.25, Sports Notes. 5.35, Talk. 6.0, Topical Talk. 6.15, Time and News. 6.25, Talk. 6.55, Dance Music. 8.15, News. 8.30, Concert by the Wiener Kammer Orchestra, conducted by Karl Anderieth; Soloist, Dr. Siegfried Seidner (Oboe). 9.30, Concert by the Wiener Symphoniker, conducted by Josef Holzer: March, Kinder, seids lustig (Navratil); Old Bavarian Ländler; Eine steirische Overture (Stälp); Waltz, Herrgott! tanz halt so gern (Ascher); In Gumpoldskirchen draust gibt's Weine! (Gebauer); Potpourri, Alles singt mit (Reckenwald); Waltz, Herenspäziert (Ziehrer); Gallop Reiseheher (Ganglberger). After the Concert, News.

WARSAW

212.5 kc/s, 1,411 metres; 120 kW.—11.38 a.m., Orchestral Concert. 2.25, News. 3.10, Pianoforte Recital by Vera Bezobrazowa: Variations in G (Mozart); Two Pieces (Schubert-Liszt): (a) Du bist die Ruh!; (b) Auf dem See; Polonaise in E (Liszt). 3.40, Book Review. 3.55, Records. 4.10, Soprano and Tenor Recital by Dobrowolska-Pawlowska and Umberto Macnez: Tenor Solos: (a) Il mio ben (Paesello); (b) Interno an idol mio (Cesti); (c) Caro mio ben (Giordano); Soprano Solos: (a) Chanson (Maszynecki); (b) Rikikitikivi (Halpern); (c) Fil d'argent (Herman); (d) Amour et coeur (Niewiadomsky); Tenor Solos: (a) The Spinner (Respighi); (b) The Wheel (Billi); (c) Perché (Pennino); (d) Ritorno a Sorrento (Curtius); Soprano Solos: (a) Autumn Song (Sinding); (b) Serenade (Mybberg); Desdemona's Aria from Otello (Rossini). 4.50, Agricultural Notes. 5.0, Talk: Solon, the Athenian Law-Giver. 5.20, Records. 6.0, Announcements. 6.20, Suggestions for Holidays. 6.25, Topical Talk. 6.40, Sports Notes. 6.47, Radio Journal. 7.0, Talk on Music. 7.15, Symphony Concert by the Philharmonic Orchestra, conducted by Pierdjawew: Soloist, Szipinalsky (Pianoforte); Symphony No. 4 (Glazunov); Pianoforte Concerto in F Minor (Chopin); Introduction to a Play (Rytel); Selection, Tsar Saitan (Rimsky-Korsakov); Pianoforte Solos. 9.40, Cigany Music. 10.0, News. 10.5, Cigany Music (contd.).

ZURICH.—See Schweizerischer Landessender.

Neapolitan Nights (Zamecnik); Midnight Waltz (Zamecnik); None but the Weary Heart (Telatnikov); Waltz, Carmen Sylva (Ivanovic); Selection from The Cunning Peasant (Fall); Des Jahres letzte Stunde (Schulz). In the interval, News. 1.30, Post

(Harpischord); Lute and Harpischord, Sonata (Diabelli); Flute and Harpischord, Sonata (Frederick the Great); Viola da Gamba and Harpischord: (a) Chaconne (Couperin); (b) Gavotte (Caix d'Heroules). 4.15, Dance Music on Records. 5.0 to 5.35, See Frankfurt. 5.35,

Paris; Beautiful Nice (Latone); Happy as the Day is Long (Koehler); Lover's Lane (Miller); Hold your Man (Freel); I've got to pass your house (Miller); Mademoiselle (Nesbit). 1.0, I.B.C. Good-night Melody and Close Down.

Grand Waltz (Rumpernick); The Elves Ball (Teilmann); Piece (Kochmann). 4.45, For Children. 5.15, Norwegian Music. 5.45, Talk on Economics. 6.0, Announcements. 6.30, Quartet in F. Op. 41 (Schumann), relayed from Trondheim, 605 kc/s, 495.8 metres. 7.0, Time. 7.1, Talk. 7.30, A Christmas Ball

ALGIERS

325.5 kc/s, 363.3 metres; 13 kW.—12.30 p.m., The Station Orchestra: Selection from The Thieving Magpie (Rossini); Le torador (Adam); L'espace (Waldteufel) 1.0, News, 1.5, Concert (contd.): Bohemos (Chauvet); Berceuse (Defosse); Le récit de dialmer

SATURDAY DECEMBER THE THIRTIETH

Fridl. 3.0, For Children. 4.0, Talk 4.20, Records. 5.0, Letter Box. 5.40, The Emil Ross Orchestra from the Café New York. 6.30, Reading. 7.0, Haydn—Radio Play (Bares). 8.30, News. 8.50, The Bela Racz Cigány Band, from the Café Baross. 9.45, Concert by the Opera House Orchestra, conducted by Ludwig Kaiter. Overture (Gimenez). Suite

SHORT-WAVE STATIONS OF THE WORLD

(N.B.—Times of Transmission given in parentheses are approximate only and represent G.M.T.)

Table with columns: Metres, kc/s, Call Sign, Station, Tuning Positions. Lists various international radio stations and their broadcast details.

PRINCIPAL BROADCASTING STATIONS OF THE WORLD

(OUTSIDE EUROPE.)

Table with columns: Metres, k/cs, kW, Station, Tuning Positions. Lists major broadcasting stations worldwide, categorized by region like U.S.A., ARGENTINE, AUSTRALIA, etc.

NEWS of the WEEK

Current Events in Brief Review

Television in Italy

TESTS with 180-line television are to start shortly at the Rome and Turin broadcasting stations.

Six Million in Sight

WITHIN the next few days British wireless receiving licences should reach a total of six million. At the end of November the total was 5,871,750, a net increase of 103,500 over the figures for the previous month.

Proof of the Pudding

A NEWCASTLE listener has inaugurated a new system of reception reports. He recently picked up the test signals from the new Budapest station and transferred them to his home recording device. He then posted the record to the station authorities, to the great delight of the engineers.

New Transmitter for Motala

IT is announced by the Swedish Postal authorities that an entirely new 150 kW. transmitter is to be erected at Motala to replace the existing 40 kW. long-wave station. The old transmitter will be transferred to another site in Southern Sweden to act as a new regional station.

Presentation to R.S.G.B. President

AT the annual general meeting of the Incorporated Radio Society of Great Britain, to be held on December 29th at 6.15 p.m. at the Institution of Electrical Engineers, a presentation will be made to the retiring president, Mr. H. Bevan Swift. The presentation will be followed by a lecture on "Transmitting Valves for Amateur Needs," by Mr. L. Grinstead.

Low-frequency "Static"

THE new French official decree against electrical interference with broadcast reception has been favourably received by the Press and the manufacturers. It is realised that the new regulations admit of a wide interpretation; for instance, it is felt that it will not be necessary to suppress all radiation from electrical apparatus provided that the emanations can be kept below the frequency response of the average loud speaker. However, to keep pace with loud-speaker developments, the Postal Administration will periodically define the frequency band in which radiation is prohibited.

The decree emphasises that steps are to be taken to avoid radiation from electrical apparatus whether or not there are any broadcasting receivers in the neighbourhood.

Licences Everywhere

WIRELESS pirates have absolutely no excuse in Italy, where radio licences can be obtained not only from the Post Office but from the banks and wireless dealers. Listeners pay 80 lire a year.

Luxembourg at Bay

ACCORDING to the Brussels "Soir," Radio Luxembourg will refuse to surrender to the Lucerne Plan by withdrawing its long wave and giving up two-thirds of its power. The French influences behind the company, it is stated, will triumph as the International Broadcasting Union "has no punitive power."

Film Recording at Fécamp

RADIO NORMANDY (Fécamp) is now broadcasting concerts recorded on film. The recording equipment has been mounted on a special lorry which tours the principal towns, such as Havre, Rouen, and Dieppe, to "collect" concerts which the station will subsequently broadcast. It is stated that the scheme is designed to save land line costs and delays.

Quarter of an Hour

NORWAY has decided that sponsored programme items shall be limited to fifteen minutes a day.

Power Transmission by Wireless?

LIKE the problem of perpetual motion, the question of the wireless transmission of power is an ever-beckoning subject for the radio inventor. It is now reported that the Swedish engineer, Balzar von Platen, of Stockholm, has solved the problem very effectively. Unfortunately, no details of the invention are yet available, but leading Scandinavian technicians are stated to have endorsed the merits of the system. A company has been formed to exploit the invention, the President being Count Folke Bernadotte.

Turin Up to Date

THE work of modernising the old 7-kW. transmitter at Turin, which "feeds" Genoa, Florence, Milan, Bolzano, and Trieste, is completed, and the station now incorporates 100 per cent. modulation, crystal control and push-pull output.

No Aerials, by Request

THE Republic of Turkey is perhaps the only country in the world where foreigners are not permitted to erect outdoor aerials. The Government wishes to take every possible precaution against the installation of transmitting stations. The regulation does not apply to Turkish Nationals.

An Adriatic Wonder

ONE of the most remarkable 20-kW. stations in Europe is that at Bari on the Adriatic coast. It is well received in Great Britain, and has been picked up in New Zealand, China, Japan and Vancouver. Bari transmits its own programmes on Mondays, but relays Rome and Naples for the remainder of the week.

Legion of Honour for Amateurs?

OUR French contemporary, the *Journal des 8*, is vigorously claiming the Legion of Honour for two famous French amateurs, Léon Déloy and Pierre Louis. Déloy was the first to establish short-wave communication between France and America in 1923, while Louis repeated this success some weeks later.

The Anti-Interference War

THE Secretary of the Newcastle-upon-Tyne Radio Society asks us to correct the impression given by a recent paragraph that the Society was asking for legislation prohibiting the supply of electric current to any premises where plant is installed that causes electrical interference to wireless reception. The Society referred to in the note was that at Newcastle, Co. Limerick.

More Money for U.S. Broadcasters

"SONG plugging," the disparagement of commercial competitors and the broadcasting of information concerning lotteries, are among the objectionable features in American broadcasting which are being definitely banned by the new National Recovery Code. The radio pay roll is to be increased, says our Washington correspondent, and should be 3 per cent. above that of the peak year, 1931. The estimated increase in employment in broadcasting will be about 765 persons.

Most of the pay roll increase will be among broadcasting engineers, of whom 1,900 are now employed. The operators' pay scale ranges from 40 dollars down to 20 dollars per week, depending upon the class and size of station.



"IN TOWN TO-MORROW." Henry Hall, leader of the B.B.C. Dance Orchestra, during a rehearsal last week of the St. Dunstan's Dance Band in preparation for its appearance before the microphone to-morrow evening (Saturday) in the "In Town To-night" series.

Radio in Every School

SPECIAL school sets working on one wavelength only are being built to the order of the Italian Government and the broadcasting authorities. All schools are to be equipped with receivers.

Wireless Over the Sea

THE much lower resistance to the passage of wireless waves which sea water affords, as compared with dry land, was discussed in a paper presented to the Royal Society by Dr. R. L. Smith Rose on December 14th. In the course of a special investigation, experimental measurements were made at the National Physical Laboratory of samples of sea water taken from the English Channel. The general result of the work has been to establish the electrical resistivity of sea water at a value of about 20 ohms per cubic centimetre.

For ordinary moist garden soil the resistance is nearly 500 times as much, and this accounts for the greater absorption experienced when wireless transmission takes place over land.

State Broadcasting: French Fears

THE French Union of Journalists has adopted a hostile attitude to the new Government broadcasting régime. In the Association's official journal it is declared that broadcasting is now "in the stranglehold of the State" and that the stations will very soon lose their individuality, as the professional microphone artists will be replaced by "bureaucrats and employees mechanically mumbling official communiqués and news telegrams."

We cannot speak for the future, but, so far, the threatened disasters show no signs of taking place.

Male Announcers Preferred

TURKEY prefers male announcers. A recent questionnaire to decide whether listeners would prefer a male or female announcer resulted in a vote of 280 for the former out of a total poll of 320. This is a personal triumph for the announcer at the Istanbul station, M. Mesut Djemil Bey.

BROADCAST BREVITIES

By Our Special Correspondent

Rival to Broadcasting House

THE skating rink in Delaware Road, Maida Vale, promises to be a much more serious rival to Broadcasting House than the Waterloo Bridge "warehouse" studio which it displaces. Among the amenities of this new-old building will be a restaurant and a retiring lounge.

Vast Acreage

As the first "sleuth" to prowl around the premises in August last—my exclusive story was "pinched" by the National newspapers who saw copies of the "W.W." at 12.1 a.m. on the day of publication—I saw enough to satisfy me that the B.B.C. could, if it wished, transform this vast covered-in acreage into something really worthy of the Corporation's resources.

That "Telephone Box" Feeling

It is impossible to imagine overcrowding of artistes and instruments at Maida Vale, and this in itself will be a welcome relief after the cooped-up conditions at headquarters.

Some artistes have confessed that the studios give them the feeling of being imprisoned in a telephone box.

Henry Hall for Maida Vale

None will welcome the change more than Henry Hall and the B.B.C. Dance Band, who will shortly be staking their claims in Delaware Road.

It is quite likely that listeners will be invited to come and dance in the skating rink, so that the band will get that added zest which comes so much more easily when playing to the dancing couples.

Brave Engineers

The acoustics of the place, too, are quite good. The engineers have already conducted some interesting tests in this connection and several of them have risked their

necks in climbing ladders to inspect the roof.

Let us think of their courage in days to come when we are sitting at our ease and listening to the pattering feet of four or five hundred Step-Sisters.

Mr. Pewter

THE mysterious "Mr. Pewter" is, of course, none other than Mr. A. P. Herbert, the famous *Punch* humorist.

"Mr. Pewter" is coming to the B.B.C. microphone shortly to give a series of talks on matters touching the interests of his feminine hearers. For their sakes he wishes to solve the problems of the day.

Good luck to you, Mr. Pewter.

The "D.G." in Ireland

SIR JOHN REITH took a flying visit last week to Belfast. No sensational inferences are to be drawn from this visit as it was purely a matter of routine.

The Director-General likes to "look up" all the B.B.C. stations from time to time, and I am pleased to think that he gives due notice of each impending visit!

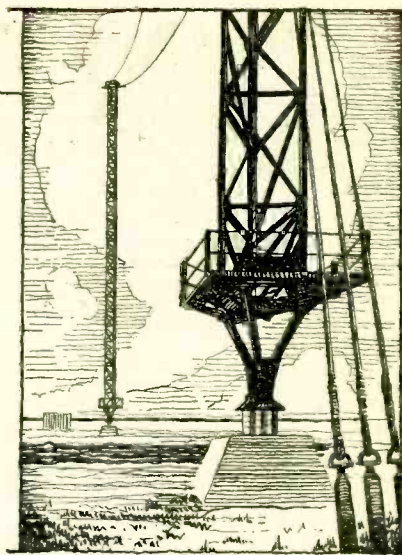
Spiritualism in the Studio

THE B.B.C. will venture into a new field with the new series of talks to be introduced by Mr. Gerald Heard on January 5th.

The title of the series: "Peeps into the Unknown," suggests the line which the speakers will take. I understand that subjects discussed will include telepathy, dreams, ghosts and survival after death.

Haunted Houses

On January 19th Mr. Theodore Besterman, of the Society of Psychical Research, will tell "How Psychical Research



is Done." Other speakers in the series will be Lord Charles Hope on "Physical Mediumship"; Professor Seligman on "Primitive Practices and Ideas"; Dame Ethel Lyttelton on "Dreams and Pre-Vision"; Sir Ernest Bennett discussing "Ghosts and Haunted Houses," and Sir Oliver Lodge on "Do We Survive?"

Wireless on the Stage

A BROADCAST receiver is used to good dramatic effect as a stage "property" in the play "Whistling in the Dark," now appearing at the Comedy Theatre.

As a climax, the resourceful hero, imprisoned by gangsters, uses the loud speaker as a substitute for the disconnected telephone instrument to summon help—which, in the best traditions of the stage, arrives in the very nick of time!

Artistic Licence?

After such a happy ending, it would be ungracious to say that technical possibilities have been stretched very nearly to breaking point; I would prefer to call it fair artistic licence, while refusing to believe that we have exhausted all the thrills obtainable by legitimate means from the broadcast receiver.

Wireless "effects" are skilfully arranged by Alexander Black, on whose activities much of the success of the play depends.

Is the Orchestra Overworked?

THIRTY-FIVE hours a week. This is the amount of time the performer in the B.B.C. orchestra is bound by his contract to serve the Corporation. The figure is interesting in view of the recent rumours that the orchestra is overworked and in need of an understudy.

How They Work

Actually, no member of the orchestra ever plays for thirty-five hours in one week—even during the hectic "Prom" period, when six rehearsals of three hours a day consume eighteen hours and the actual performance time is no more than twelve hours.

What the Accountant Thinks

However, I learn that the question of a second orchestra is being seriously considered—by Mr. Lockhead, the B.B.C. accountant! Can the B.B.C. afford another National Orchestra? And is it really necessary?



NOW OR NEVER! A tense moment during the amusing crook play, "Whistling in the Dark," at the Comedy Theatre. Richard Bird and Billie Riccardo, as the hero and heroine respectively, find a new use for the wireless set.

This Week's Set Review

Thermo Superjet Three

An Ambitious Design to Provide Mains Performance Where No Electric Light Supply is Available

THE applicability of mains-driven receivers to A.C. and D.C. mains only has for long been an admitted weakness of the type. Statistics have been brought forward to show that for every householder who is connected to A.C. or D.C. there are several who are not, and who are in consequence deprived of being able to make effective use of mains-driven sets, even if they have bought them. Our enterprising radio industry has fulfilled the expectations we have so often exclusively expressed in these pages, and the Thermo Superjet Three brings the benefits hitherto enjoyed by A.C. and D.C. consumers to the millions who are connected to gas mains only.

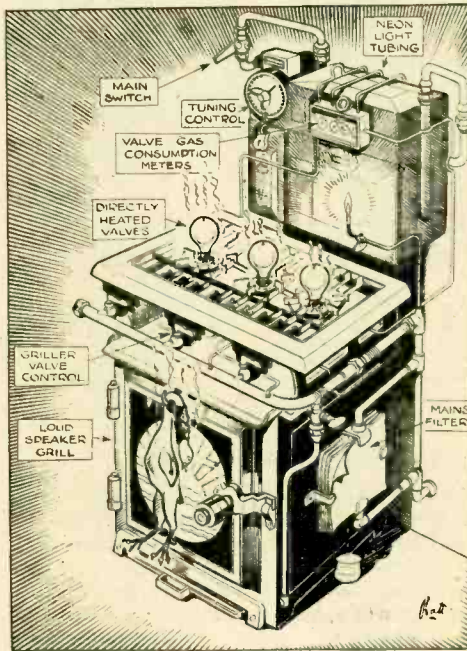
It might be supposed that the designer would impose severe limitations on himself in undertaking a task of this nature; but in the instance of the present receiver he has contrived to introduce a number of important advantages, which will no doubt lead to many all-electric homes being piped for gas at an early date.

The valves are all of the gas-filled type, and have a slope of 5 milliamps per therm. They are directly heated—and so, for the matter of that, is the whole receiver—being provided with incandescent burners at the base. As usual, these are fitted with by-passes, the by-pass condensers having a capacity of 0.005 cu. ft. A pilot light is also fitted, which serves the dual purpose of illuminating the tuning scale and casting a subdued but quite adequate radiance over the whole room. A variety of artistic shades can be obtained to suit most of the less usual decorative schemes.

The power pack consists of a gas-ring and multiple thermo-couple assembly, and this should be lit well in advance of any desired programme. A gasmeter, operating on the push-pull principle, is a feature of special interest to the more technical enthusiasts. The increased consumption when political talks are being broadcast can be readily observed.

The thoroughness with which the design

has been carried out may be gauged from the fact that the wiring is done entirely with gas-filled tubes of the type used for illuminated advertisements, and the different circuits can be identified with the utmost ease by the colour-code that has been standardised by the R.M.A. The



Domestic utility has been the keynote of the designer's effort in producing this revolutionary instrument.

location of any fault can thus be seen at a glance, which greatly simplifies servicing. Though this might seem to render skilled servicemen unnecessary, the manufacturers have made assurance doubly sure by equipping selected plumbers in each district throughout the country with a complete kit of tools for dealing with any fault. It is understood, also, that gas inspectors have been instructed to encourage the use of

FEATURES. Type.—General purpose receiver for gas mains only, incorporating almost everything. **Circuit.**—Variable-mew gas-filled valves coupled by neon-tubes. No rectifier needed. **Controls.**—(1) On-off tap, with shilling-in-the-slot orifice. (2) Roast-or-boil switch. (3) Automatic smell control. **Rent.**—2/11½d. per quarter. **Makers.**—The Gas Bright & Choke Co., Ltd.

these receivers by making themselves as helpful as possible, and are to be provided with portable wavemeters and calibration charts. It is also understood that a small gas-producer plant is shortly to be marketed for the benefit of those who are not yet piped.

The difficulties so common in soldered connections, due to dry joints, have been entirely overcome; and in fact wiped joints are used throughout. A mains filter has also been incorporated, consisting of six stages of blotting paper connected in series, with the object of removing every trace of moisture introduced by the mains, and so reducing the damping of the tuned circuits.

An Unusual Cabinet

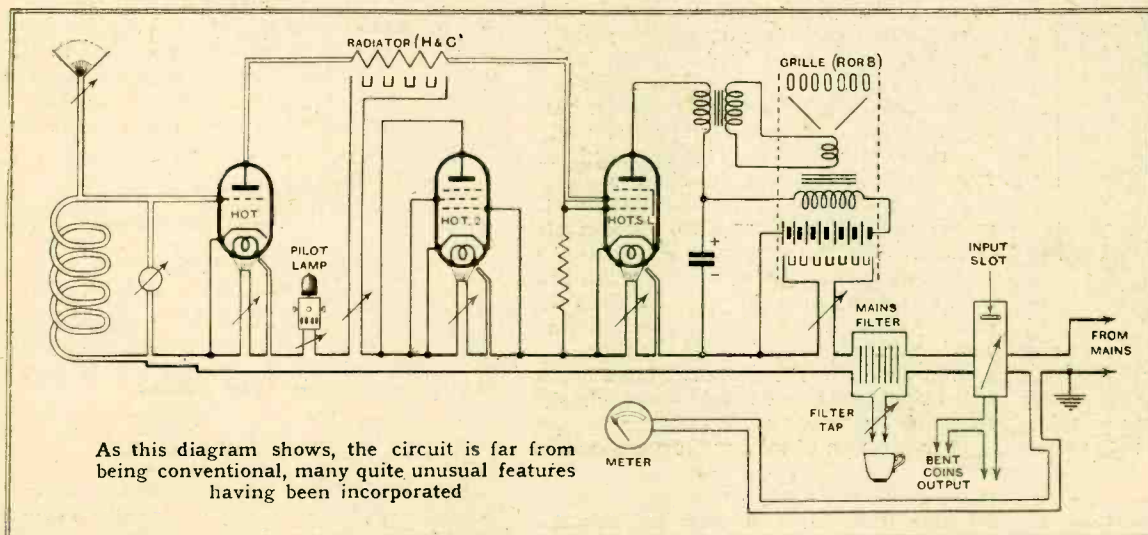
The cabinet is made of cast iron about 2½ inches thick, and is artistically finished in dull black, which has the additional merit of aiding the dissipation of the considerable amount of heat that is given off. This heat would hitherto have been considered a disadvantage, but in this model it has ingeniously been made possible to roast a joint or poultry during reception of the hotter types of dance music by hanging them on a hook provided in front of the loud speaker grille. This gives rise to occasional frying noises, which are not really serious however.

The controls consist of a main on-off tap, with shilling-in-the-slot input circuit, a roast-or-boil switch, and an automatic smell control. Until the taps are turned on, the smell is barely perceptible with the nose two yards from the loud speaker.

An example of the extraordinary attention to detail is the variable-mew valve to prevent mice from nesting in the gasmeter. As cats are not favoured in Germany, sets exported to that country make use, instead, of the well-known Barkhausen effect.

It should be mentioned that six yards of flexible hose are included with each receiver, which should therefore be of some use, even in the most unfavourable localities.

The set was tested on an indoor aerial five miles from the Gas Bright and Choke Co.'s works, at first on a lighting circuit. As there were symptoms of low tension, the connection was transferred to a higher pressure supply by displacing the gas cooker. Because the Model No. EL rendered the cooker redundant, no harm resulted.



As this diagram shows, the circuit is far from being conventional, many quite unusual features having been incorporated

Thermo Superjet Three—

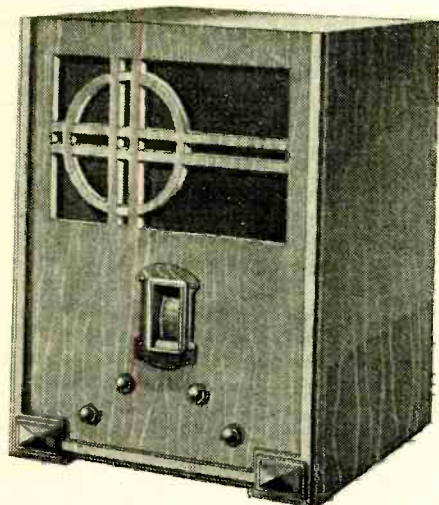
Apart from a good deal of hiss, reception was at first rather poor: but after investigating the fault with the aid of a pocket cigarette-lighter, the whole affair blew up with a loud report, followed by a complete fade-out. The test had therefore to be abandoned at this point, but there is no difficulty in declaring the performance to be outstanding in every direction. The power output was more than adequate for domestic purposes, and the programme was of definite entertainment value to listeners situated at a considerable distance. Reproduction was well forward, with strongly marked transients. It is true that there was a certain amount of break-through, together with side-band cutting, but these were not noticed at the time.

We have hesitated in the past to apply the adjective sensational to any receiver that has passed through our hands, but as the one at present being reviewed nearly passed through our face as well it would be hypercritical to withhold that description any longer.

NOTE.—As our usual set reviewer is on his Christmas holidays, the feature is supplied this week by our contributor, Mr. M. G. Scroggie. We therefore ask the indulgence of our readers in the event of any errors having been included.

AMATEUR CABINET MAKING**Wood for Home Constructors**

ATTENTION is now being focused on the subject of radio cabinet design, both from the functional and artistic aspects. Amateur woodworking contrasts strongly with receiver construction, and introduces an element of variety; those who feel impelled to exercise their abilities by making not only the set but the container as well will be interested to know that, in the issue of *Hobbies* for November 18th, the building of an up-to-date cabinet in Spanish chestnut was fully described. A supplementary design chart is issued, copies still being available from the address given below.

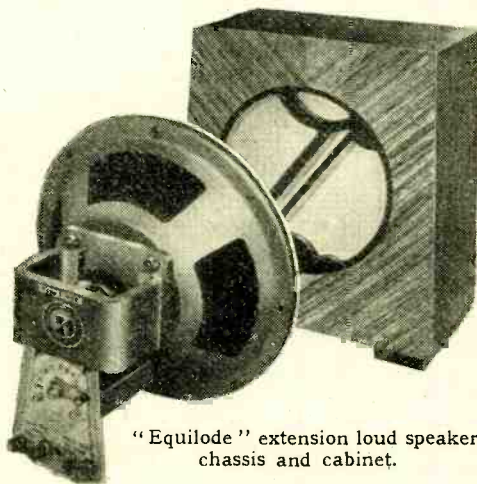


"Hobbies" cabinet for home construction.

The cabinet measures approximately 15in. wide, 19in. high, and 10½in. deep; it is consequently large enough for most modern sets. A parcel containing all the necessary wood is obtainable for 11s. 3d. from *Hobbies*, Ltd., Dereham, Norfolk.

"EQUILODE" LOUD-SPEAKER

FOLLOWING up the success of the "Microcode" unit the Whiteley Electrical Radio Co., Ltd., Radio Works, Mansfield, Notts, have now produced a new model working on the same principle and specially adapted for use as an extension loud speaker. It is fitted with a variable ratio transformer adjustable by means of a single switch arm.



"Equilode" extension loud speaker chassis and cabinet.

An off position is provided so that the extension unit alone may be cut off if desired. The unit is suitable for use with sets requiring either a high impedance or low impedance load on the extension terminals. It may also be used with certain sets, including a Class "B" output stage. The type number is PM5X. It is available in chassis form at £1 13s. 6d., or in a compact cabinet of modern design at £2 8s. 6d.

Photo-electric Cell Applications, by R. C. Walker and T. M. C. Lance, pp. 193, figs. iii. (Pitman, 1933. Price 8s. 6d.)

THIS book, which is largely based on developments carried out by the research laboratories of the General Electric Co., at Wembley, is an expansion of a series of articles which have appeared from time to time in the *Wireless World*. The alkali metal photo-electric cell is now obtainable in a standard bulb similar to a receiving valve, and when used in conjunction with a thyatron forms a compact mains-operated unit capable of handling power up to 20 kilowatts with an input signal of only 1 microwatt.

The variety of applications of such a light-sensitive relay is surprisingly great. The authors take us through various fields of industry and give clear descriptions and circuit diagrams of the layout which is suitable for each particular problem. In order to meet the high standard of performance required for commercial work the unit is invariably arranged to give warning if any failure should occur in the circuit.

It is in the advertising domain that the public is most familiar with photo-electric devices. Window displays are arranged to go into action by light reflected from a hand held up to an indicated part of a shop window. Water flows from a spout when a cup is held in position. Light is thrown on a book as soon as it is opened by a reader. Road signs light up at night by mechanism operated by motor car headlights.

In the section of talking films a very complete account is given of the part played by the photo-cell in reproduction from the sound track. It is shown how the new caesium-on-silver cells obviate troubles due

to frequency distortion and to hum caused by lamps flickering at double the frequency of the supply mains.

Smoke is detected by its effect in reducing the illumination of a cell arranged in a balanced circuit. In Pullman cars this device controls the ventilating system and only pure air is admitted. Cells can be made sensitive to various spectral regions, and the freedom of choice thus obtainable is used, for example, in television transmitters. Here a blue scanning light is used since potassium cells are most sensitive and the eye least sensitive to this colour.

Many other applications are given in the book, which contains sufficient detailed information to enable the experimenter to construct devices for almost any purpose where a beam of light can be made to act as a signal.

R. T. B.

EVERYMAN A.C. SUPER (See pages 472-4 of this Issue)

LIST OF PARTS

After the particular make of component used in the original model, suitable alternative products are given in some instances.

- | | |
|--|---|
| 1 R.F. Super Radiopak, 110 kc/s | British Radiophone |
| 1 Bulb, 6 volts, 0.15 amp. | Bulgin 615 |
| 2 I.F. Transformers, 110 kc/s | Varley "Nicore" BP.42 |
| | (Colvern.) |
| 1 Screened H.F. choke, Ch1 | Bulgin H.F.10 |
| | (R.I., Wearite.) |
| 2 Fixed condensers, 2 mfd., D.C. working | C7, C8 |
| | T.C.C. 50 |
| 3 Fixed condensers, 0.1 mfd., tubular, | C5, C6, C9 |
| | T.C.C. 250 |
| 1 Fixed condenser, 0.005 mfd., | C13 T.C.C. Type "M" |
| 1 Fixed condenser, 0.01 mfd., | C15 T.C.C. Type "M" |
| 2 Fixed condensers, 0.0002 mfd., | C11, C12 |
| | T.C.C. Type "M" |
| 4 Fixed condensers, 0.0001 mfd., | C1, C2, C3, C10 |
| | T.C.C. Type "M" |
| | (Dubilier, Peak, Telsen.) |
| 1 Electrolytic condenser, 50 mfd., | C16 T.C.C. 521 |
| 2 Electrolytic condensers, 4 mfd., | C18, C20 |
| | T.C.C. 802 |
| 3 Electrolytic condensers, 8 mfd., | C14, C17, C19 |
| | T.C.C. 802 |
| | (Dubilier, Peak, Telsen.) |
| 2 Metallised resistances, 150 ohms 1 watt | R8 Dubilier |
| 1 Metallised resistance, 400 ohms 1 watt | R16 Dubilier |
| 1 Metallised resistance, 500 ohms 1 watt | R7 Dubilier |
| 1 Metallised resistance, 800 ohms 2 watts | R17 Dubilier |
| 1 Metallised resistance, 4,000 ohms 3 watts | R4 Dubilier |
| 1 Metallised resistance, 5,000 ohms 3 watts | R5 Dubilier |
| 2 Metallised resistances, 10,000 ohms 1 watt | R10, R11 |
| | Dubilier |
| 1 Metallised resistance, 20,000 ohms 1 watt | R6 Dubilier |
| 2 Metallised resistances, 250,000 ohms 1 watt | R3, R12 |
| | Dubilier |
| 2 Metallised resistances, 1 megohm 1 watt | R13, R14 |
| | Dubilier |
| 2 Metallised resistances, 2 megohms 1 watt | R1, R2 |
| | Dubilier |
| (Erie, Graham-Farish, Claude Lyons, Seradex, Watmel.) | |
| 1 Tapered volume control, 250,000 ohms | R15 |
| | Rothermel Type 1-010-004 |
| | (Magnum.) |
| 1 Plain brown knob | British Radiophone |
| 1 Potentiometer, 5,000 ohms | R9 Watmel T.2 |
| | (Haynes Radio, Claude Lyons.) |
| 1 Smoothing choke, 10 henrys | Ch2 Sound Sales |
| | (Bulgin, Ferranti, Heayberd, Rich & Bundy.) |
| 1 Mains Transformer, Primary, 200 to 250 volts, | |
| 50 cycles; secondaries, 300-0-300 volts, 75 | |
| mA., 4 volts, 2.5 amps., centre-tapped; | |
| 4 volts, 4/5 amp. centre-tapped. | |
| | Rich & Bundy Type No. 233 |
| (Challis, Heayberd, Savage, Sound Sales, Vortexion.) | |
| 5 Valve holders, 5-pin | W.B. Reversed Terminal Type |
| 1 Valve holder, 7-pin | W.B. Reversed Terminal Type |
| | (Bulgin, Clix.) |
| 1 Westector | Westinghouse W.26 |
| 1 On-off Toggle switch S1 | Bulgin S.80 |
| | (Claude Lyons.) |
| 1 Double-pole double-throw switch S2 | Bulgin S.98 |
| 1 5-pin plug | British Radio Cramophone Co. |
| | (Bulgin.) |
| 4 Ebonite shrouded terminals, A., E., pick-up (2) | |
| | Belling-Lee "B" |
| | Harbros |
| 1 Length of Screened Slewing | |
| 1 Loud speaker with pentode output trans- | |
| former and 2,500 ohms field | Rola F.6/P.2,500 |
| Cabinets for set and speaker | Peto-Scott |
| | (C.A.C.) |
| 1 Plymax baseboard, 10½in. x 16in. x ½in. | Peto-Scott |
| 2oz. No. 20 tinned copper wire, aluminium, | |
| 12 lengths Systoflex, wood, etc. | |
| Screws:— | |
| 4 ¼in. No. 4 R/hd. | 4 ¼in. No. 4 R/hd. |
| 6 ½in. No. 4 R/hd. | 12 ½in. No. 4 R/hd. |
| | All with nuts and washers. |
| 12 1in. No. 4BA R/hd with metal thread and nuts and washers. | |
| Valves:—2 Ferranti VPT4. 1 Ferranti VHT4. 1 Osram or Marconi MPT4 (Calkin). 1 Osram or Marconi MU12. | |

New Apparatus Reviewed

Latest Products of the Manufacturers



Scientific Supply Stores new dual-range, and plug-in type, short-wave coils.

SCIENTIFIC NEW SHORT-WAVE COILS

THE Scientific Supply Stores (Wireless), Ltd., 126, Newington Causeway, London, S.E.1, have introduced two new short-wave coils, one of which is of particular interest, as it is wound with Litz wire. The other model is, also, somewhat unconventional, for it is mainly air spaced and constructed from heavy gauge turned copper wire supported on a skeleton former.

The Litz-wound coil is a dual-range type wound on a 2 1/4 in. moulded former, with separate windings for aerial, grid, and reaction circuits. Tested in an orthodox det.-L.F. set fitted with a screen grid detector valve, exceptionally good results were obtained. As in all short-wave receivers of this type, sensitivity depends largely upon reaction, and the most marked feature of this coil is the ease and smoothness with which reaction is obtained over the whole range. Owing to its high efficiency, this is achieved without any considerable change in the reaction condenser capacity between minimum and maximum settings of the tuning condenser, provided the aerial loading is kept small. Using a 0.00015 mfd. tuning condenser and 0.0003 mfd. reaction condenser, the two wavebands covered were 13.5 to 33.3 metres and 31 to 68.8 metres respectively.

It is extremely difficult to differentiate between the performance of the two coils, as the larger air-spaced model was also much above the average. Reaction, however, was not quite so constant, and greater use had to be made of the reaction condenser to maintain the set just on the threshold of oscillation. No doubt this could be improved by a tighter coupling between grid and anode coils.

The range covered by this model was 12.1 to 30 metres, using a series aerial condenser of 0.0001 mfd., the circuit otherwise being the same as for the first coil. It is fitted with a six-pin base, and we understand a second coil will shortly be available to extend the range.

The dual-range model costs 6s. 6d., and the single-range type 4s. 6d. Its baseboard mount costs 1s. 6d.

TUNGSRAM UNIVERSAL VALVES

IN the Tunggram range of valves is a series of indirectly heated types that can be used on either A.C. or D.C. supplies, the customary arrangement being to dispense with the usual filament winding on the transformer and join the heaters in series, using a limiting resistance to drop the surplus volts.

They take 0.18 amp. each and the majority require 20 volts across the heater; of the remainder two are rated at 40 volts each, and one at 10 volts. In all there are 15 different types: three are H.F. pentodes, two variable-mu S.G. valves, one screen-grid model, three are triodes with one power output valve, two are pentodes and one is a Class "B" type. There are two mains rectifiers and a single-diode-tetrode, so that every type is represented.

Only a few samples could be tested, but these suffice to show that the stated characteristics are well maintained in the production models. The G2018, a general purpose triode, gave on test a mutual conductance of 3.1 mA./V. as compared with the maker's rating of 3.5 mA./V., while its amplification factor was 26.9, the rated value being 25. This brought the A.C. resistance to 8,600 ohms. The glass bulb is metallised and its price is 10s. 6d.

A screen grid valve, the S2018, was next tested; this is not a variable-mu type but operates normally with a grid bias of 1.5 volts. With 200 volts on the anode and 100 volts on the screen and a grid bias of -1.5 volts, its mutual conductance was 1.6 mA./V. and its amplification factor 480. As its rated values are 1.2 mA./Volt and 400 amplification, respectively, the specimen tested was even better than normal. With the stated operating voltages the anode current is 7.2 mA. and the screen current 1.5 mA.



Tunggram Universal-type indirectly heated valves, SE2018, G2018 and P2018d.

Finally the characteristics of the variable-mu SE2018 valve were investigated, its mutual conductance and amplification factor being measured with different values of grid bias. These are given in the table for a

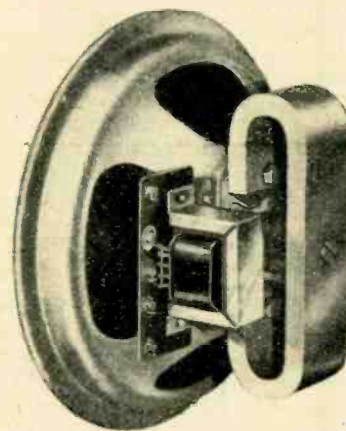
Valve.	Grid Bias Volts.	Amplification Factor.	Mutual conductance mA/volt.	A.C. Resistance (Ohms).
Tunggram Type SE 2018....	-2	310	1.55	200,000
	-4	270	1.08	250,000
	-6	245	0.77	320,000
	-8	230	0.57	400,000
	-12	208	0.33	630,000
	-16	195	0.2	960,000
	-20	186	0.12	1,500,000
	-24	180	0.06	3,000,000

maintained anode potential of 200 volts and 100 volts on the screen.

According to the makers' figures its mutual conductance should change from 1.4 mA./V. with -2 volts grid bias to 0.03 mA./V. with -40 volts. The average anode current with minimum grid bias is 10 mA. and the screen current 2.1 mA. The price of this valve is 14s. 6d., and the makers are Tunggram Electric Lamp Works (Great Britain), Ltd., 72, Oxford Street, London, W.1.

MAGNAVOX TYPE 252 LOUD SPEAKER

THIS is the "Senior" model of the permanent magnet series and is fitted with a gin. diaphragm and a composite magnet system in which the centre pole is of cobalt alloy and the remainder of the magnetic



Magnavox Type 252 "Senior" permanent magnet loud speaker with dust cover removed.

circuit of chromium alloy. The chassis is neatly finished in grey cellulose enamel and is of rigid construction. A universal transformer gives a range of load impedances from 3,000 to 19,000 ohms and is also fitted with terminals for Class "B" and other types of push-pull output stages.

The efficiency of the unit is comparable with that of a standard energised model and the useful frequency response extends from 75 to 8,000 cycles. The principal bass resonance occurs at 90 cycles, but it is well supported by a group of subsidiary resonances of slightly lower frequency, with the result that coloration is not noticeable. The middle register is uniform and the high-note response is excellent, being maintained to a much higher point than usual yet without undue emphasis of sibilants. The general balance on music is full-bodied without lacking clarity, and we have no hesitation in recommending the unit for its good all-round performance.

The speaker is enclosed in a dustproof bag with an ornamental silk front, and the price is 3 guineas. The makers are The Benjamin Electric, Ltd., Tariff Road, Tottenham, London, N.17.

Next Week's Set Review :

R.G.D. RADIO-GRAMOPHONE Model 1201 A.C.

Readers' Problems

Double Diode Pentode

A USER of the New Monodial receiver has noticed that, although the anode current of the DD/Pen second detector is reduced considerably on tuning in a strong signal (according to expectations), there is actually a slight rise in current when a weak transmission is being received. It is asked whether this effect is in any way abnormal.

It is unusual to find that anode current rises slightly when tuned to a feeble signal, or to the "fringe" of a strong one—which amounts to the same thing. The rise in current may be ascribed to the grid current characteristics of the valve, but anode current should fall when the set is tuned to a signal strong enough to put the A.V.C. system into action.

Niceties of Ganging

THAT divine discontent which marks the true wireless amateur has clearly prompted a query regarding alignment of ganged circuits in a fairly conventional three-valve receiver, of which the sections concerned are reproduced in simplified form in Fig. 1.

Almost everyone knows that, for really accurate ganging, everything must be matched and symmetrical in each one of the tuned circuits; inductance values of all the coils must be identical, each section of the tuning condenser must have the same capacity at all angular settings. Lastly, the value of stray capacity across each circuit must be the same, or provision must be

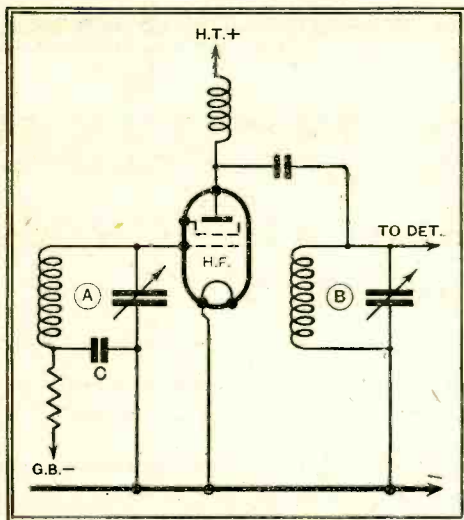


Fig. 1.—Circuits A and B are not entirely symmetrical; the first includes a by-pass condenser C, which may impair ganging unless certain precautions are observed.

made for making it so artificially by means of trimmers. The present problem deals with another disturbing factor—the by-pass condenser in grid decoupling circuits.

Unless a by-pass condenser of the same capacity be included in all the tuned circuits, it is clear that the possibility of misalignment is introduced; the present question is concerned with the fact that the H.F. grid circuit of our querist's receiver includes a by-pass condenser, while the band-pass input circuit and the H.F. intervalve coupling do not. We are asked to say whether the addition of a "padding" condenser in each of the other circuits is likely to improve alignment.

THESE columns are reserved for the publication of matter of general interest arising out of problems submitted by our readers. Readers requiring an individual reply to their technical questions by post are referred to "The Wireless World" Information Bureau, of which brief particulars, with the fee charged, are to be found at the foot of this page.

Briefly, it may be stated that, provided the by-pass condenser be of very high capacity in relation to the tuning condenser, it is most unlikely that it will upset ganging. A capacity of 0.1 mfd.—a standard value in H.F. circuits—is 200 times larger than that of the tuning condenser, and so should have a negligible effect when compared with the inevitable discrepancies elsewhere.

A grid by-pass condenser of considerably lower capacity, however, might conceivably upset the relative tuning of the circuit in which it is included. It should be made quite clear that the disturbing effect of the condenser becomes more marked as wavelength is increased, and so its effect cannot in any way be balanced out by adjustment of the trimming condenser.

A final point: an inductive condenser is clearly undesirable in the position in question, for the reason that its inductance will be additive to that of the coil, and so will cause mis-matching.

A Non-radiating Receiver

A CORRESPONDENT, obviously blessed with a commendably strong sense of his obligations towards his neighbours, enquires whether the New Monodial receiver is likely to cause interference through radiation. He has previously used "straight" sets, and has heard that a superheterodyne may annoy other listeners.

Admittedly, some superheterodynes, that shall be nameless, radiate almost as strongly as they receive! But most modern sets are reasonably free from blame, and the New Monodial in particular should never give trouble on this score. Not only is there a stage of H.F. amplification, but also the tetrode portions of the frequency changer valve are interposed between the oscillator and the aerial. This amounts to very much the same thing as the interposition of two H.F. stages, which would normally prevent any possibility of radiation. Further, the questions of layout and wiring were specially studied with a view to preventing any accidental transference of energy to the aerial circuit.

The Wireless World

INFORMATION BUREAU

THE service is intended primarily for readers meeting with difficulties in the construction, adjustment, operation, or maintenance of wireless receivers described in *The Wireless World*, or those of commercial design which from time to time are reviewed in the pages of *The Wireless World*. Every endeavour will be made to deal with queries on all wireless matters, provided that they are of such a nature that they can be dealt with satisfactorily in a letter.

Communications should be addressed to *The Wireless World* Information Bureau, Dorset House, Stamford Street, London, S.E.1, and must be accompanied by a remittance of 5s. to cover the cost of the service. The enquirer's name and address should be written in block letters at the top of all communications.

Non-amplifying H.F. Stage

A READER has found by experience that the H.F. stage of his receiver is rendered completely ineffective by disconnecting the anode decoupling condenser. Contrary to expectations, disconnection does not produce instability, but merely seems to have the effect of "reducing H.F. amplification to practically zero."

The effect is quite different from that encountered in any other circuit of the receiver—or in any other receiver—where the experiment has been tried, and we are asked to suggest a reason.

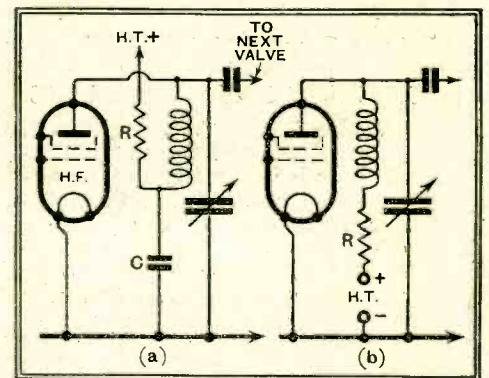


Fig. 2.—By disconnecting condenser C, the resistance R is placed in series with the tuned-anode circuit, as shown in diagram (b).

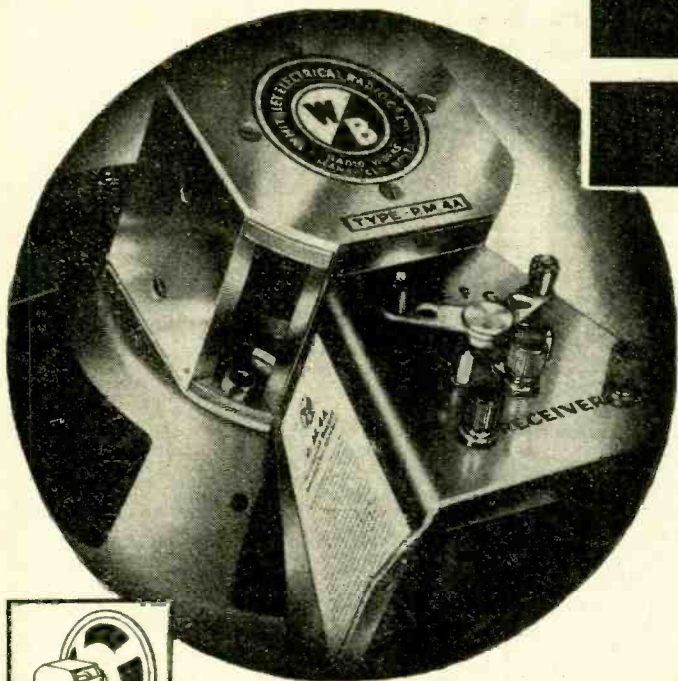
It seems fairly certain that tuned-anode H.F. coupling is used in the set, and that matters are arranged in the conventional way, as in Fig. 2 (a). As a result of disconnecting the by-pass condenser C, through which the tuned circuit is normally completed, oscillations are diverted through the decoupling resistance R, and also the various resistances and impedances of the H.T. wiring and battery (or eliminator). Fig. 2 (b) represents the circuit under these conditions. As R is likely to have a value of about 1,000 ohms, it is understandable that the circuit will be so heavily damped that the stage can no longer amplify.

Patchy Instability

IT has often been suggested that when making initial adjustments or tracing certain types of fault, it is a good plan to put the A.V.C. system temporarily out of action. We repeat this advice for the benefit of a correspondent whose newly constructed "2-H.F." receiver is giving trouble. It is complained that the background, when not tuned to a transmission, is excessively noisy, and that many of the signs of instability are present, although the manifestations of uncontrollable self-oscillation are not the same as in a set without automatic control.

From further information given to us we think that there can be no doubt that the set actually is lacking in stability over a large section of the wavebands which it covers. Instability cannot, however, show itself in the ordinary way, because the H.F. valve grids are, under certain conditions, biased well back by A.V.C. action.

It is therefore recommended that the control circuits should be disconnected, and that our correspondents should concentrate on stabilising the H.F. circuits before proceeding farther.



17 Ratios for power or pentode: 4 for Class B give perfect matching. The Mansfield magnet gives greater sensitivity.

HOW MANY LISTENERS REALISE?

Extract from "Wireless World."

"... a choice of seventeen ratios is available for single output valves and four ratios for push-pull stages requiring a centre tap. The change both in volume and quality, on varying the step-down ratio, is most marked, and the load can be rapidly adjusted to give the best results. Tested with the load adjusted to the calculated value, the efficiency was found to be exceptionally good for a permanent-magnet unit. Above 100 cycles it was equal to that of our standard 10 in. energised unit. The PM4A is also remarkable for the excellent response at the extreme top. Between 7,000 and 9,000 cycles it has a better output than any small commercial unit so far tested."

A user writes :

"I wonder how many listeners realise (as I did when trying out the 'Microlode' pointer) how much volume is wasted when the speaker is not correctly matched to the output valve?"

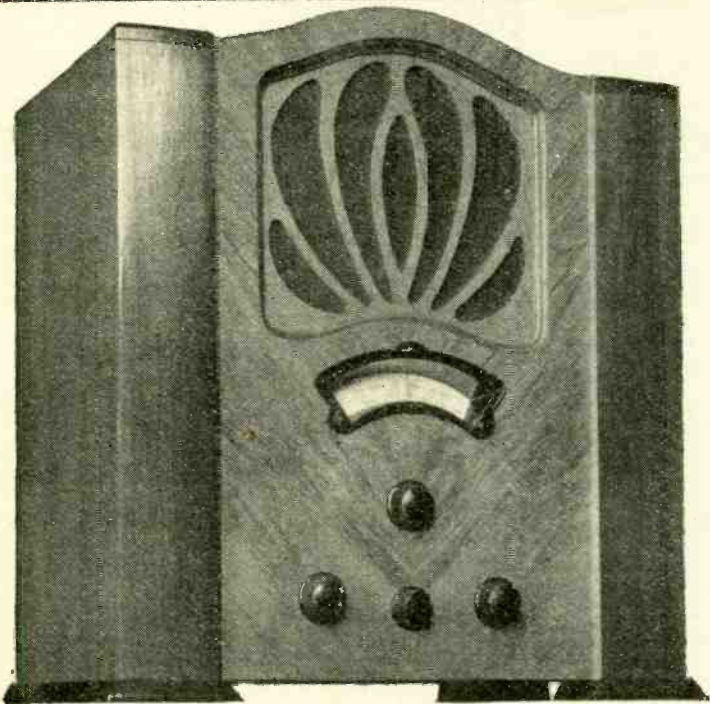


'Microlode' Model PM4A 42/-

'Microlode' Model PM6 32/6

Whiteley Electrical Radio Co. Ltd.,
Sole Agents in Scotland : Radiovision Ltd., 233 St. Vincent St., Glasgow.

Dept. W, Radio Works, Mansfield, Notts.
Sole Agents in I.F.S. : Kelly and Shiel, Ltd., 47 Fleet St., Dublin.



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3 watts undistorted output. Automatic volume compensation. Progressive tone control. Double band-pass tuning. Electrostatic screening. Electro-dynamic moving coil speaker. Write now for full details.

High praise for this new all-pentode superhet!

Extract from "The Wireless World," Dec. 15th.

"The design shows several departures from conventional practice, and a highly creditable performance has been attained in relation to the comparative simplicity of the circuit design.

On test, we found the set unusually free from background noise. This is accounted for by the use of an electrostatic screen... a feature we should like to see more widely adopted.

The makers are to be congratulated on the loud speaker reproduction, which has an unusually spacious quality, particularly in the bass. Individual instruments in the orchestra stand out clearly, and the general effect is not unlike that associated with dual unit loud speakers.

PRICE
13
GNS.

The cabinet is well finished, and is imposing in appearance, as it should be in a set giving

so high a standard of volume and quality."

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All letters relating to advertisements should quote the number which is printed at the end of each advertisement and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

IMPORTANT NOTICE.

Owing to the Christmas Holidays, the next issue of "THE WIRELESS WORLD" (dated December 29th) is closing for press earlier than usual.

In accordance with the Notice that appeared last week, the latest date upon which Miscellaneous Advertisements could be accepted for the above issue was FIRST POST, FRIDAY, December 22nd.

RECEIVERS AND AMPLIFIERS, ETC.

MURPHY B5, makers' guarantee; what offers?—Fletcher, Barrington Lodge, Chigwell Row, Essex. [4289]

TRADERS, send for catalogue, 6d. stamps; mains receivers, all the best makes.—Perseus Radio, Burton-on-Trent. [0407]

£7/15.—Mains radio S.G. det. and Pen., 200-250 A.C. Rola M.C. in superb futuristic cab; listed £13/13, c.o.d., carriage paid.

£7/10.—Combined A.C./D.C. S.G. det. and Pen., 100-250 volt, Rola M.C. in latest modern horizontal oblong walnut cab, straight line dial in metres, etc., c.o.d., carriage paid.—Kay, 167, City Rd. E.C.1. [4320]

G.E.C. 5v. Superhet A.C. Radiogram, bankrupt stock, packed; list £26 5, £16 (deposit system).—Particulars, 151, Wellingborough Rd., Northampton. 4315

PUSH-PULL D.C. Amplifiers, with 2 P.P.3/425's in output, complete with 500v. line booster, brand new; £14, carriage paid.—Ward, 2nd Floor, 45, Farringdon St. E.C. [4321]

D.C. Monodial Superhet, all specified components and valves, "Magnarox" Magna dual speakers, perfect, owner now on A.C.; £18.—Radio Supplies, Deardengate, Haslingden. [4293]

QUALITY Receiver for Sale, 6-watt output, in handsome mahogany cabinet on special stand, guaranteed perfect condition and quality reproduction; what offers?—Phone: Beckenham 1939. Box 8913, c/o The Wireless World. [4297]

ARMSTRONG Latest 4v. Chassis, now incorporates 3 pentodes, 3 tuned circuits, full band-pass square peak tuning, 2½-watts undistorted output, massive layer wound mains transformer, ideal for making high quality radiogram; 84/-, with valves 118/-.

ARMSTRONG 1934 Universal 4v. Chassis, incorporating 3 tuned circuits, 9 kilocycles separation, practically superheterodyne performance, full vision tuning, combined switching, 1½ watts output; 75/-, with valves 114/-; both models fully guaranteed; 7 days' trial; demonstration any time.—Phone: Gulliver 3105. Armstrong Co., 100, King's Rd., N.W.1. [4127]

AMPLIFIERS.—2-stage transformer, coupled push-pull output, on 22in. pressed steel chassis, cadmium plated and cellulose plated, 4 Marconi valves, 16 watts anode dissipation, with provision for 200 volts 5C millamps H.T., and 4-watt 6 amp heater current for radio unit if used; ideal for demonstration or P.A. work; original price 30 guineas, my price £8, carriage paid; cash with order.—L. Eastwood, S. and Engineer, 70, Pitfield St. Old St., N.1. [0411]

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Exact to Specification

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KIT-BITS Selected C.O.D. Items. You pay the postman. We pay post charges on all orders value over 10/- Great Britain only.

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2 VARLEY Nicore B.P.42 I.F. Transformers	1	3
1 RICH & BUNDY Type No. 233 Mains Transformer	1	18
1 Set of specified Valves	4	8
1 Sound Sales Smoothing	1	15

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Complete, as illustrated **45/-** on right. Cash or C.O.D.
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HOYNE'S Transformers, used by many well known set manufacturers after testing all others.

HOYNE'S Transformers, fitted with tapped and screened primaries, filaments all centre tapped, stout cast aluminium clamps and clearly marked Bakelite terminal strips are fitted to all models.

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HOYNE'S New Monodial Transformer. 425-0-425v. 120 m.a., 4v. 3a., 4v. 1a., 4v. 1a., 4v. 6a., 24/-, post 1/3; weight 10lb.; 10 henry choke, 6/-, post 6d.; 20 henry choke 7/6, post 6d.

HOYNE'S.—250-0-250v. 60 a.m., 4v. 1-2a., 4v. 2-4a., 10/-, post 9d.; with extra 4v. 1-2a. winding, 12/6, post 1/-.

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HOYNE'S Line Transformers (auto-wound) tapped 0-100-110-200-220-240v., 60 watt, 8/6, post 9d.; 120 watt, 10/-, post 1/-.

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VORTEXION A.C./34, used by author in construction of A.V.C. Three, as illustrated; 18/-.

VORTEXION.—Please note brown lead omitted in blue print, is screened primary connection and should be earthed to chassis.

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IF You Haven't Tried Them Yet Ask Someone Who Has, or call and inspect complimentary letters.

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VORTEXION for A.V.C. Straight Four, 200-250 input, 450-0-450v. 120 m.a., 4v. 2.5a. C.T., 4v. 5-6a. C.T. with screened primary, shrouded in cast aluminium to prevent hum, super model 10-volt primary taps; 30/-.

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VORTEXION.—250-0-250 60 m.a., 4v. 1 to 2a., 4v. 2 to 4a., open type, 10/6; shrouded, 12/6; post 9d.

VORTEXION Transformers, tested with 2,000 volts between windings.

VORTEXION.—Ferrocarril 111, 350-0-350, 60 m.a., 4v. 2.5, C.T., 4v. 3.5, C.T.; open type 13/6, shrouded 16/-; post 9d

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VORTEXION.—350-0-350, 120 m.a., 4v. 2 to 5a., 4v. 2 to 4a., 4v. 2.5a.; open type 14/6, shrouded 16/6.

VORTEXION.—400 or 450 or 500v., 120 m.a., 4v. 2 to 5, 4v. 2 to 5, 4v. 2.5a.; open type 19/-, shrouded 23/-.

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VORTEXION 600-watt Transformers; £4/10, carriage free.

VORTEXION 30h. at 60 m.a. Chokes, 5/6; 40h. at 60 m.a., 8/6; 30h. at 150 m.a., 200 ohms, 10/6 open type, 12/6 shrouded.

VORTEXION Transformers Made to Your Specification; price according to wattage, 6v. filaments same price unless wattage grossly exceeded; special quotations by return.

VORTEXION (S. A. BROWN), 182, The Broadway, Wimbledon, S.W.19. Tel.: Liberty 2814. [4189]

SERADEX Mains Equipment, new list now ready.

SERADEX Variable Resistances for Television, etc., type H.A., 150 ohms, as specified for "Practical Mechanics Telediscovisor," also televisions described in "Amateur Wireless," and "Television"; 9/11, post paid; new illustrated leaflet just issued.

SERADEX Battery Chargers; models from £2/12/6; send for lists; a better job at a lower price.

SERADEX Filter Condensers, new list available shortly; type B, 400v. working, non-inductive, 0.5 mfd., 1/4; 1.0 mfd., 1/6; 1x1 mfd., 2/6; 2 mfd., 2/3; 4 mfd., 4/5; 4x4 mfd., 7/3.

ADVERTISEMENT of Trevor Pepper, 575, Moseley Rd., Birmingham, 12. [4285]

TANTALUM for A.C. Chargers, H.T. and L.T.—Blackwell's Metallurgical Works, Ltd., Garston, Liverpool. [3448]

A.C. Charging Plant (new), output 40 volts 6 amperes; listed £18/18, accept £8.—Jersey, Cumnor Hill, Oxford. [4131]

"DULCI" Unused D.C. Eliminators, 25 milliamps output, 13/-; Westinghouse rectifiers, H.T.6, H.T.7, H.T.8, H.T.9, 10/-; H.T.10, 11/3; T.C.C. 8 mf. electrolytic, 3/9; B.T.H. pick-up tone arms, 3/-; post paid, cash with order or c.o.d.—Ward, 2nd Floor, 45, Farringdon St., E.C. (new address). [4199]

CABINETS.

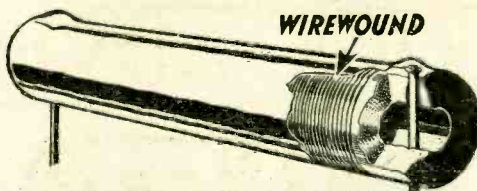
RADIOGRAM Cabinets; fully illustrated list free; remarkable values.—Gilbert, Cabinet Maker, Swindon. [1686]

RADIOGRAM Cabinets, manufacturers' clearance.—Brunswick (Model 70), 45/-; (Model 90), 70/-; Zetavox (Model A.G.), 50/-; new, clean goods.—H. L. Smith and Co., Ltd., 289, Edgware Rd., London, W.2. [4313]

DYNAMOS, ETC.

E.D.C. Converter, 200 watts, 240 D.C./A.C.; reasonable offer accepted.—Blakes Wharves, Stevenage Rd., S.W.6. [4305]

ROTARY Converters, 220 volts D.C. to 200 volts A.C., capacities up to 0.44 K.V.A.; from £4/10.—Mik Engineering Works, Milo Rd., East Dulwich, S.E.22. Phone: Sydenham 4422. [4235]



WHY THE HYWATT?

Why have many set manufacturers chosen the Hywatt resistance for their 1934 sets? The answer's simple. The Hywatt is the most advanced resistance on the market: because—

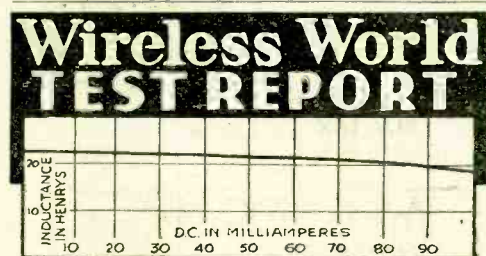
1. The element is wire. This means (a) Much Closer tolerance than in the carbon type. (b) Fixed resistance value unchangeable in operation.
2. Each turn is insulated. This makes it suitable for high voltages, and it will not break down.
3. Moisture proof and noiseless due to welding of lead wire.

Made in all values from 1 - 50,000 ohms.



Please write for folder, telling you all about the Hywatt, to—

Watmel Wireless Co. Ltd., Imperial Works, High Street, Edgware, London. Telephone: Edgware 0323.



The above chart reproduced from "The Wireless World" Test Report, emphasises the remarkably Constant Inductance of Sound Sales' Chokes.

SOUND SALES 10hy CHOKE

designer's first choice "EVERYMAN A.C. SUPER"

Also Mains Transformer as specified. Aluminium clamp £2.



This is the Sound Sales famous 10hy Choke as also specified and used in all models of the "MONODIAL"

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products also used by leading TELEVISION companies and well-known experimenters.

Write for Lists "W" etc.—Mains Transformers—Chokes—Sound Speakers—Sound Unit (Class B), etc.

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SOUND SALES LTD., Phone: Archway 1961-2

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GRAMOPHONES, PICK-UPS, ETC.

COLLARO Radio-gram Unit, motor pick-up, volume control, perfect condition, changing to automatic; £3.—Holmdene, Poole Rd., Bournemouth. [4295]

LOUD-SPEAKERS.

FOR Speakers Refer to Last Week's Advertisement.—K.C. Radio Electric, 14, Handel St., London, W.C. [4325]

FOR Speakers Refer to Last Week's Advertisement.—H.D. Radio Electrical Service, 9, Kingly St., London, W.1. [4324]

TRADERS.—Loud speakers of all kinds, with your other requirements; catalogue 6d.—Perseus Radio, Burton-on-Trent. [0409]

EPOCH.—Annual sale of surplus loudspeakers of all kinds, also sets, amplifiers and useful parts of every description; great bargains; lists on application.—Epoch Radio, Exmouth House, Exmouth St., E.C.1. [4294]

30/- !!!—B.T.H. R.K. moving coil speakers, 6in. cone, new and unused, guaranteed; these speakers are the type as used in cinema sound equipment, suitable for public address work; weight 30lb., and vastly superior to the cheap speakers now on the market, 100 volts, 150 volts, and 200 volts D.C.

27/6 !!!—6-volt D.C. speakers, as above; £2/7/6 complete with field rectifier.

B.T.H. Transformer brand new, ratios 1-1, 2-1, 20-1 and 30-1 microphone; 7/- each.

MAGNAVOX D.C.144, 2,500 and 6,500 ohms, 17/6; carriage paid, cash with order or c.o.d.—Ward, 2nd Floor, 45, Farringdon St., E.C. (New address). [4201]

RADIO AGENCIES Offer New Set Manufacturers' Surplus; all goods carriage paid, cash with order, or c.o.d.—Moving coil speakers, Magnavox X core, 7 1/2 in. cones, 100-190 D.C., 2,500 ohms (40-76 m.a.), or 190-280 D.C., 6,500 ohms (29-43 m.a.), at 18/- each, Seniors, 9 1/2 in. cones, same voltages, at 25/- (U.S.A.); Itala's 7 1/2 in. cones (list 35/-), at 18/-; Seniors, 9 in. cones, list 47/6 at 25/-, in following voltages: 2,000, 2,500, 6,500 ohms; on all speakers state if power or pentode transformer, all incorporate humbuckers; also few duals, Glass "B" and permanent magnets.—Radio Agencies, No. 37, Albemarle St., London, W.1. [4276]

PICTURE RECEIVER APPARATUS.

TELEVISION Constructor's Guide, 1/3, illustrated catalogue free.—Angel Television, 16, Highbury Terrace, N.5. [4296]

VALVES.

EPTON Leads Again!—Bargains in Lissen, Tungram, Triotron, Dario, valves.—H.210, H.L.210, L.G.210, H.R.210, 3/3; P.220, P.215, Z.D.2, 4/3.—Epton, 93, New Rd., Chingford, E.4. [430E]

AMERICAN Valves!—Brand new R.C.A. and Arcturus, 224s, 247s, 235s, 151s, 10/6; 227s, 245s, 280s, 7/6; cash with order, or c.o.d.—Norman Michel, 51, St. Matthew's Parade, Northampton. [431E]

ALL Types of Brand New American Valves in Stock, first class makes, guaranteed; 247, 235, 224, 244, 236, 18, 19, 15, 242, 238, 46, 59, 89, 2A, 7, 12/-; 80, 45, 226, 227, 8/-; 250, 281, 210, 17/6; post paid, cash with order or c.o.d.—Ward, 2nd Floor, 45, Farringdon St., E.C. (new address). [420C]

SPECIAL Offer.—Valves by world-famous Continental manufacturers, fully guaranteed, screen grid, variable mu screen grid, high magnification screen grid, low magnification screen grid, H, HL, L; all the above standard mains type, 4/6 each.—Premier Supply Stores, 20-22, High St., Clapham, S.W.4. Macaulay 2188 [3911]

COMPONENTS, ETC., FOR SALE.

PREMIER

PREMIER SUPPLY STORES Offer the Following Set Manufacturers' Surplus New Goods at a Fraction of the Original Cost, all goods guaranteed perfect, carriage paid over 5/-, under 5/- postage 6d. extra (Ireland, carriage forward).

ELIMINATOR Kits, including transformer, choke, Westinghouse metal rectifier, T.C.C. condensers, resistances and diagram, 120v. 20 m.a., 20/-; trickle charger 8/- extra; 150v. 30 milliamps, with 4v. 2-4 amps. C.T., L.T., 25/-; trickle charger, 6/6 extra; 250v. 60 milliamps, with 4v. 3-5 amps. C.T., L.T., 30/-; 200v. 100 milliamps, with 4v. 3-5 amps. C.T., L.T., 49/6; 300v. 60 milliamps, with 4v. 3-5 amps. C.T., L.T., 37/6; 150v. 50 milliamps, 27/6.

T.C.C. Condensers, 750v. working, 2 mf., 3/6; 4 mf. 6/-, 4 mf. 450v. working 4/-, 250v. working 1 mf. 1/3, 2 mf. 1/9, 4 mf. 2/6; aqueous electrolytic, 440v. working, 4 mf. 3/-, 8 mf. 3/6.

ALL the following Lines 6d. each or 5/- per dozen: 4- and 5-pin chassis mounting valve holders; shielded screen grid or pentode leads; 1-watt wire end resistances, any value; 0.1 condensers; on-off switches, push-pull; polar ganging devices; 0.02 condensers, 0.5 condensers, 0.01 condensers, 0.2 condensers.

POLAR 3-gang 0.0005 Condensers, split end vanes, totally screened disc drive; 6/11.

MSCO Triple-gang, 0.0005 Condensers, with trimmers, 4/11.

T.C.C. Electrolytic Condensers, 100 volts working, 15 mfd., 1/3; 6 mf. 50v., 1/-.

PREMIER Chokes, 40 m.a., 25 hys., 4/-; 65 m.a., 30 hys., 6/-; 150 m.a., 30 hys., 10/6.

PYE Chokes, 20 or 32 hys., 4/-; Premier multi-ratio output transformers, giving 15 different ratios; 7/6.

HIGH Inductance Chokes, resistance 2,500 ohms, 80 henrys, 60 m.a.; 5/6.

WESTINGHOUSE Metal Rectifiers, 120v. at 20 m.a., 6/6; 200v. at 30 m.a., 8/6; 200v., 60 m.a., 10/-.

HARLEY Pick-up, complete with arm and volume control; 12/6.

BRITISH RADIOPHONE Wire Wound Potentiometers, B with mains switch incorporated, 5,000 ohms, 10,000 ohms, 50,000 ohms, 10,000 ohms, any value; 3/6.

KOLSTER BRANDES Gramophone Motors, dual type, can be worked by clockwork or mains, induction type 100-250 volts, 25/-; complete with all fittings and turntable.

SPECIAL Offer.—Microphones by prominent manufacturer, high sensitivity, uniform response, complete with stand, transformer and battery; listed £3/15, our price 18/6.

(This advertisement continued on next page.)

NEW YEAR RESOLUTIONS are supposed to be made to be broken

If you wish to turn over a new leaf, being tired of Boomy Bass, or No Bass at all. Shriill "Top," or No "Top" at all. Odd Spots of Resonance. Distortion Inherent in your Speaker. Lack of Enjoyment of your Radio. General Fed-upness.

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You will not be able to break that resolution, as the undistorted reproduction of our speaker is IRRESISTABLE.

We are giving you a week's notice so that you can start the New Year well.

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- A.C. Model - 8 Gns.

"New Notes in Radio," 1½d., and worth it.

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These Resistors are made from a special compound that is guaranteed for ever. Cannot disintegrate. Constant resistance. Silent in operation. In the unlikely event of any Resistor not giving full satisfaction, we will replace it willingly, or refund purchase price, without any time limit.

TRADE ENQUIRIES INVITED

A set of Resistors for any advertised Constructor's Kit sent post free by return for 8d per Resistor; or sample Resistor of any value sent for 8d post free together with COLOUR CHART.

One Hundred Resistance Values from 50 ohms to 2 megohms. Each one a separate Colour Combination.



SCIENTIFIC DEVELOPMENT CO.
55-57, Guildhall Street, PRESTON. Tel.: 4364.



Components, etc., for Sale.—Contd.

(This advertisement continued from previous page.)

PREMIER British Made Meters, moving iron, flush mounting, accurate; 0-15, 0-50, 0-100, 0-250 milliamps, 0-1, 0-5 amps., all at 6/-.

OHMIC Condensers, 2-gang, semi shielded, 2/6; wire wound potentiometers, 15,000 ohms, 1/6.

SPPECIAL Offer of Mains Transformers, manufactured by Philips, input 110-115v. or 200-250v., output 180-0-180 volts, 4q m.a., 4v. 1a., and 4v. 3a., 4/6; 200-0-200v., 4v. 1a., 4v. 3a., 4/6.

ALL Premier Guaranteed Mains Transformers have engraver terminal strips with terminal connections, input 200-250 volts, 40-100 cycles, all windings paper interleaved.

PREMIER H.T.8 Transformers, 250v. 60 m.a., rectified, with 4v. 3-5a. C.T., L.T., and screen primary, 15/-; with Westinghouse rectifier, 25/-.

PREMIER H.T.9 Transformer, 300v. 100 m.a., rectified, with 4v. 3-5a. C.T., L.T., and screened primary, 15/-; with Westinghouse rectifier, 26/-.

PREMIER H.T.10 Transformer, 200v. 100 m.a. rectified, with 4v. 3-5a. C.T., L.T., and screened primary, 15/-; with Westinghouse rectifier, 26/-.

DDOUBLE Spring Motors, made by Garrard, play five sides of 10in. record, complete with turntable and all fittings, 17/6.

SPPECIAL Offer.—Accumulator chargers, input 200-250v. A.C. to charge 2- and 4-volt accumulators at ½ amp.; owing to the high efficiency of the silver oxide rectifier employed charger may be used during broadcast; 9/6 each.

CENTRALAB Potentiometers: 50,000, 250,000 and 500,000 ohms, 2/- each; ditto, wire wound, 200 ohms and 400 ohms, 1/-.

A FEW More Only.—Western Electric 4211E's and 4211D's, 15/-; 4212's, 23; callers only.

WESTERN ELECTRIC Mains Transformers: 500-0-500v., 150 m.a., 4v. 3-5 amps., 4v. 2-5 amps., 4v. 2-3 amps., 4v. 1 amp., C.T., 4v. 1 amp., C.T., 19/6.

RELIABLE Canned Coils with circuit; accurately matched; dual range; 3/- per coil.

PREMIER L.T. Supply Units, consisting of Premier transformer and Westinghouse rectifier, inputs 200-250 A.C. output 8v. ½ amp., 13/6; 8v. 1 amp., 17/6; 15v. 1 amp., 19/-; 6v. 2 amp., 27/6; 30v. 1a., 37/6.

PREMIER Mains Transformers, output 135v. 80 m.a. for voltage doubling, 8/6; 4v. 3-4a., C.T., L.T., 2/- extra; Westinghouse rectifier for above, giving 200v. 30 m.a., 8/6.

PREMIER Mains Transformers, output 250-0-250 volts, 60 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. (all C.T.), with screened primary, 15/-.

PREMIER Mains Transformers, output 350-0-350 volts, 90 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. (all C.T.), with screened primary, 15/-.

PREMIER Mains Transformers, output 400-0-400 volts, 100 m.a., 4v. 4-5a., 4v. 2-3a., with screened primary, 15/-.

PREMIER Auto Transformers, 100-110/200-250 volts or vice versa, 60-watt, 7/9; 100-watt, 10/-.

SPPECIAL Offer of Manufacturers' Type Transformers, any input, output 250-0-250 volts, 60 m.a., 4v. 1a., 4v. 3a. (both C.T.), 8/6; H.T.8 transformer, with 4v. 3-4a. (C.T.), 8/6; with rectifier, 18/6.

MAGNAVOX D.C.144, 2,500 ohms, 17/6; D.C.154, 2,500 ohms, 17/6; D.C.152 Magna, 2,500 ohms, 37/6; all complete with humbucking coils; please state whether power or pentode required; A.C. conversion kit for above types, 10/-; Magnavox P.M., 7in. cone, 18/6.

BULGIN 3 amp. Mains Switch, 1/-; lever switches, 2, 3 or 4 way, 3 pole, 1/- either type.

WESTERN ELECTRIC Mains Transformers, 300-0-300, 60 milliamps, 4v. 1-2 amps., 4v. 2-3 amps., 8/6.

GRAMPION P.M. Loud-speakers, 9in. cone, handles 4 watts, 18/6.

GRAMPION M.C. Loud-speakers, 2,500 ohm field, 9in. cone, handles 6 watts, 21/-.

HM.V. Condenser Blocks, 4x4x1x1x0.5, 250v. working, 3/6; ditto, 400v. working, 5/6.

ELLIOT First-grade Moving Coil Meters, 0-30, 0-50, 0-100, 0-150 milliamps, projecting types, 15/- each; 0-100, 0-150 milliamps, flush types, 17/6 each.

B.T.H. Induction Type (A.C. only) Electric Gramophone Motors, 100-250v.; 30/- complete.

AMPLION Moving Coil Speakers, type E.M.644, dual fields, 2,500 and 5,000 ohms (100 and 200v.), with output transformer, 12/6; A.C. conversion kit for this speaker, 10/- extra.

WESTERN ELECTRIC Condensers, 250v. working, 1 mid. 6d., 2 mid. 1/-; 500v. working, 1 mid. 1/-.

T.C.C. Condensers, 250v. working, 4x4x1 mid., 3/6; 6x4x2x2 mid., 375v. working, 6/11; 4x4x1, 6/-.

SPPECIAL Offer of Wire Wound Resistances.—4 watts any value up to 10,000 ohms, 1/-; 8 watts, any value up to 15,000 ohms, 1/6; 15 watts, any value up to 1,000 ohms, 2/-; 25 watts, any value up to 50,000 ohms, 2/6; 50 watts, any value up to 50,000 ohms, 3/6.

PREMIER SUPPLY STORES, 20-22, High St., Clapham, S.W.4, Macaulay, 2188. Closed 1 o'clock Wednesdays, open to 9 o'clock Saturdays. Nearest Station, Clapham North Underground.

PREMIER. [4220]

MAINS RADIO'S Exclusive Guaranteed Surplus, as new, carriage paid, or call.

ERIE Half-watt Resistors, colour coded, 4½d., 2/- half dozen; one-watt colour coded resistors, 5½d., 2/6 half dozen; all sizes, your selection.

T.C.C. Condensers, 1 mid., 250v. working, 1/-; 0.01 and 0.1 tubular, 350v. working, 6d.; Class B driver transformer and choke, 9/5, matched pair.

PERMANENT Magnet Sinclair M.C.s, new, boxed, 7in. cone, 20/6; ditto, energised, 16/6; Clix 4 and 5-pin chassis v.-holders, 1/6 half dozen.

CENTRALAB 10,000 and 15,000 Potentiometers, with mains switch, 1/11; 100,000, no switch, 1/3.

THREE-GANG 0.0005 Trimmers, drum drive, 4/11; De Forest 432 S.G. valves, 2/-; complete suitcase portable cases, 3/11.

STERLING Block Condensers, 250v. working, 4x4x1x1x1x1x1x1 mid., 3/11; ten 0.1 mids., 2/7; Polymet, 0.0001, 0.001, 0.002, fixed, 1/- half dozen.—Mains Radio Development Co., 4-6, Muswell Hill Rd., London, N.6. [4273]

1-WATT Carbon Resistances, 500 ohms to ¼ megohm. 1½d., 1/- dozen, plus postage; special for quantities.—54, Herne Hill Rd., S.E.24. [4230]

W.W. Battery Three" Chassis and Components, half list price. Foranti A.P.5, 13/6; O.P.M.1c, 14/-, —51, Bemsted Rd., Walthamstow, E.17. [4317]

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"Class B" Amplifier Unit 23.
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TRANSFORMER AND CHOKE STAMPINGS, INSTRUMENT AND RESISTANCE WIRES.
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NEW ADDITIONAL FILTERS
TYPE A.4. for the output circuit. Connects in series with your output transformer. Complete filtration of interfering frequencies over 3500 C.P.S. Carries up to 80 M.A. 16/- and 400 V. Price
TYPE A.5. for intervalve use. tuns to 11/- whistle with panel mounting Condenser.
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New blueprints and circuit diagrams for the construction of Mains Units, Battery Chargers and Units for energising low voltage M.C. speakers. Helpful hints and technical data for those interested in mains working. Complete details of the wide range of Mains Units, Class 'B' Units, Transformers, Battery Chargers, Amplifiers and Condensers manufactured by Heayberd—the Mains Specialists! All completely revised and up to date.

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What about January?

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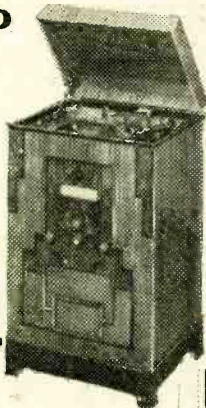
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The only British Instrument of its kind at the price.

All mains . . . A.C. or D.C. . . fitted Garrard Auto Record Changer playing eight tunes . . . circuit comprises 1 H.F. Screened Grid Stage, power pentode detector, special pentode output and indirectly heated rectifier.

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Langford Works
WESTON-SUPER-MARE

Components, etc., for Sale.—Contd.

R. SELECTED Parts for Sale, as new; e.o.d. or "Wireless World" deposit system, which we recommend if in doubt as to the splendid value offered; we take risk of damage in transit to our customers; goods tested for callers and guaranteed.

FERRANTI A.C. Speaker for 200-250v. A.C., listed £9/10, £4/10; pair Magnavox 144 dual speakers, 2,500 ohm each, £2 pair; Westinghouse H.T.7, 9/-; H.T.8, 9/6; H.T.9 10/6; Blue Spot, class B P.M., listed 32/6, 20/-.

FERRANTI Bandpass Unit Complete, 45/-; Seradex mains transformer, 500v., etc., 25/-; Savage 500v., 20/-; Vortexion 450v., 20/-; shrouded Gambrell J. Novotone, for medium resistance P.U., 30/-; Polar drum dials, 2/9; Ferranti portable type voltmeter, 1,000 ohm per, 10-50-250v., 45/-.

UNIKNOBS, Polar 2-gang, r.w., brown, 9/-, with cover 10/6; Polar disc drive, complete with Polar No. 4, 0.0005; listed 9/-, 4/6 the two.

RADIOPHONE 100,000 ohm pots, 2/-; R. & A. type output transformers, 18-23-32-1, 5/-; Paxolin formers, lin., 8d.

T.C.C. Condenser Blocks, 250v. working, 4x4 mfd., 3/6; H.M.V. 4x4, 3/-; T.C.C. 4x4x1x1x1/2, 4/6; H.M.V., 3/6; T.C.C. 0.01 mica, type M, 1/-; Telsen new 0.05 mica, 2/3.

J.B. Universal log, 0.0005 variable, 3/6 each; pair Colvern R2R coils, 4/6; valve rectifier, complete, 150v. 50 m.a., for field energiser, 15/-; B.T.H. Golden disc induction motor, perfect, £2.

EPOCH 20c. Speaker, new, 25/-; R.I. Q.P.P. transformer and choke, second-hand, 19/-; Varley impedance matching transformer, 7/6, for high resistance speakers.

SPECIAL Offer of Ryall's 4v. 3 amp. C.T. Filament Transformers, input 200/250v., 6/9 each to clear; Ryall's 4 ml., 250v. working, 2/6; 4 ml., 500v. working 6/6, 2 ml. 750v. working 3/6; all guaranteed 12 months.

RADIOPHONE Disc Drives, new, with large escutcheon plate complete, fit 3/16in. spindle, read 0-100 from left to right; 5/6, post free.

SPECIAL Offer of 3v. and Rectifier (valve) Chassis, from Yagerphone, all guaranteed, new, and very well made, chassis only; 50/-; with valves 80/-.

RYALL'S RADIO Offer Reliable Resistances, suitable for all sets where a 1-watt resistance is specified, in values 100, 250, 500, 1,000, 2,000, 5,000, 10,000, 15,000, 20,000, 25,000, 30,000, 40,000, 50,000, 75,000, 100,000, 150,000, 250,000, 1/2 meg., 2 meg., all values stated in ohms, 6d. each; also 2-3-watt type, 1,000, 10,000, 9d.

EDISON BELL 10,000 Eureka, wire wound, with holders, 1/-; Edison Bell 0.0005 universal log all metal condensers, 1/6, new.

SPECIAL Offer of Pye 20h. Chokes, 40 m.a., 130 m.a., maximum D.C. resistance 300 ohms, in brown crystalline finish, new, unused, Pye 32h. chokes, D.C. resistance 750 ohms, 30 m.a., 80 m.a. maximum, ditto, 4/6 each, post free.

RYALL'S RADIO, 33, Chancery Lane, London, W.C.2 (nearest Tube Chancery Lane; bus 67 passes door, or tram to Savoy St.), Holborn 3529. Open Saturday afternoon. Close 7 p.m., Thursdays 1 o'clock, Saturday 6 p.m.

R. [4299]

MILDMAY RADIO EXCHANGE Offers the Following, sound and perfect.

SPECIAL Offer, 6 only.—5-valve A.C. mains chassis, complete with the following valves: 2 A.C. Var. Mu.'s, A.C. screen grid as a detector Pentode output, and a D.W. 3 rectifier, suitable for use with 2,500 ohms speaker; net price £6.

MARCONI Speaker Magnets (only), weighs 14lb., 15/-; Gambrell Senior Novotone, standard model, 32/6; Ferranti A.F.4, 8/-; A.F.3, 11/-; A.F.6, 17/-; A.F.5c, 19/-; A.F.5cc, 20/-; O.P.M.1, 10/-; O.P.M.1c, 14/-; O.P.M.2c, 12/6; O.P.M.3c, 12/6.

WESTON, Type 301, 0-100 volt, 17/6; pair Varley intermediate coils, 12/6; Radiopax superhet. model, 37/6; pair Colverdynes, 12/6; Varley, Nicore I, 9/-; Varley Nicore II, 6/6; Wearite and Lewcos superhet coils, 4/6 each; Radiophone 4-gang condensers, fully screened, 16/-; pair Colvern K.B.L.C. and one K.G.R., 17/-; ditto, mounted on "Wireless World" chassis, 19/-; pair K.B.L.C., also pair K.G.C., 20/-; Lewcos B.P.F./G., 7/-; T.O.S./G., 5/6; pair R.I. Q.P.P. transformers, 15/-.

THE Above Post Paid.

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SPEAKERS.—Permanent magnet speakers, 7in. cone, 28/- (listed 49/6); D.C. rains energised, 2,500 to 6,500 ohms, complete with humbucking coils and transformers, 16/6 (list 39/6); Magnavox D.C. moving coil speakers, latest type, "154", all voltages, 17/6 each; G.E.C. Stork speakers, complete in magnificent cabinet, 19/6 (listed £3/15); Ormonde speakers, complete in cabinets, 10/- (listed 25/-); Blue Spot, 100U, 15/6 (list 39/6).

READY RADIO "303" A Kits, complete with cabinet, M.C. speaker, less valves, £2/5; with 3 Mullard valves (P.M.11.F., P.M.2D.X., P.M.2), £3/5 (list £6/17/6).

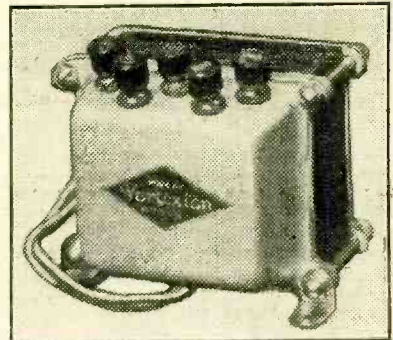
READY RADIO Meteor "A" 3 valve Screen Grid Kit, complete with cabinet, M.C. speaker, less valves, £3/7/6; with 3 Mullard valves (P.M.12A., P.M.2D.X., P.M.2A), £4/10 (list £8/7/6).

READY RADIO S.T.400 Kits, as specified by Scott Taggart; £2/19/6 each (list £4/17/6).

(This advertisement continued on next page.)

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MAINS CHOKES & TRANSFORMERS of Superlative Quality



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EVERYMAN A.C. SUPER

VORTEXION A.C./375 MAINS TRANSFORMER. Primary, 200 to 250 volts, 50 cycles; secondaries, 300-0-300 volts, 75 m.a., 4 volts, 2.5 amps, centre-tapped; 4 volts, 4/5 amp. centre-tapped.....

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SMOOTHING CHOKE for this receiver, 10 henrys

7/6

A.V.C. STRAIGHT 4

SUPER MODEL MAINS TRANSFORMER. Exactly as specified by the Designer. Fully shrouded

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SPECIAL POWER SMOOTHING CHOKE for this receiver. Details as specified

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Every Transformer is massively built of best quality material. Varnished paper interleaving, subjected to 2,000 volts test between windings, ensures an exceptionally large safety factor.

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VORTEXION

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Phone: Liberty 2814.

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SPECIAL Christmas Bargains: Twin-gang tuning units for broadcast wavebands, with special switch position for Fecamp, list price 12/6, our price 6/6; also 0.0095 J.B. S.M. variable condensers, list price 8/6, our price 3/9; 1/- blue prints free!—N.R.S., Ltd., 15, Alfred Place, London, W.C.1. [4292]

SPECIAL Christmas Offer by Modern Radio.—All goods offered in last week's advert, subject to a further discount of 10% on all orders received not later than the last post on the 30th December, 1933. May we take this opportunity of wishing all our customers a very Happy Xmas, and sincere wishes for a more prosperous New Year. Look out for our future adverts, they will interest you.—Modern Radio, 25, York Terrace, London, S.W.4. Tel.: Macaulay 3409. [4306]

TO Callers.—A large quantity of Marconi, H.M.V. public address apparatus, comprising complete 60 watt outfits, with converters, to work off ear accumulators, all mains A.C. amplifiers, up to 200 watts, automatic changing turntables, heavy duty Parmeko chokes and A.C. transformers, and numerous other items; full detailed list and prices in next issue of "The Wireless World."—Note change of address: H. Franks, 23, Percy St., Tottenham Court Rd., W.C.1. [4310]

UNUSED Manufacturers' Surplus.—Magnavox No. 142, 2,500 ohms, humbucking coil and pentode transformer, 26/-; R.T.H. "Truespeed" motor, bronze, 40/-; Marconiophone No. 17 pick-up, bronze, 28/-; Radiophone superhet 3-gang, with covers and dial, 17/6; Bryce mains transformer, 350-0-350, 120 m.a., 4 volts, 2.5 amps., 4 volts 4 amps., shielded primary, 16/-; Colvern, set pair K.B.L.C. band-pass and K.53 osc. coils with switch, 20/-; Colverdyne's 110 kc., 8/-; all unused.—Rodo, 118, St. Dunstan's Av., Acton, W.3. [4216]

CLASS "B" COMPONENTS.

SPECIAL Offer.—A few surplus new Class "B" speaker units, incorporating the famous "Sound Unit" and 42/- Whiteley Boneham moving coil speaker; supply subject being unsold, 45/- each; now replaced by new design incorporating the "Sound Speaker."—Sound Sales, Ltd., Tremlett Grove, Highgate, N.19. [0401]

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EPOCH.—Annual sale of surplus loudspeakers of all kinds, also sets, amplifiers, and useful parts of every description; great bargains; lists on application.—Epoch Radio, Exmouth House, Exmouth St., E.C.1. [4293]

EASY Payments.—We supply, by easy payments, components, accessories, and sets, any make; 10% down, balance spread over 11 months.—Send list of requirements to London Radio Supply Co., 11, Oat Lane, London, E.C.2. [0357]

AMBITIOUS Men.—Qualify for a well-paid post by studying at home with The T.I.G.B. Write to-day for "The Engineer's Guide to Success," 144 pages, free, which contains the widest selection of engineering and wireless courses in the world, and shows you how to become A.M.I.E.E., A.M.I.Nech.E., A.Rad.A., etc. State branch post or qualification that interests you.—The Technological Institute of Great Britain, 82, Temple Bar House, London, E.C.4. (Founded 1917, 19,000 successes.) [4107]

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EXTRACT from Testimonial, original of which may be seen: "Glasgow, 11/12/33. You supplied me with Illustralight for Pathe this time last year; it has been very satisfactory in every way. I have used it in small halls, giving good clear pictures 10x8ft." and there are many others.

CINEMATOGRAPHS from 20/-, complete in every detail, ready for showing, making ideal Christmas gifts; projectors, 9.5 mm., 16 mm. and 35 mm., of every possible description. Over 150 to select from.

YOUR Personal Inspection Invited for Everything for Movies including films from 1/-; 9 mm., 16 mm., 28 mm., and 35 mm.; slides, lanterns, projection bulbs, lenses, condensers, cameras.

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PATENTS and Trade Marks, British and Foreign.—Gee and Co. (H. T. P. Gee, Member R.S.G.B. and A.M.I.R.E.). 51-52, Chancery Lane, London, W.C.2. Phone: Holborn 1525. [0001]

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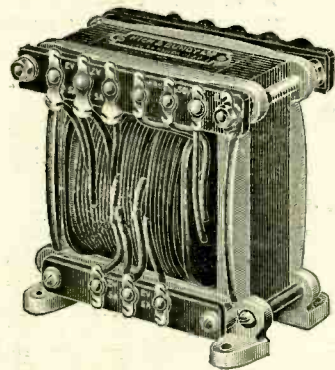
SPECIALIST in the Manufacture of Amplifying Equipment of any output, also mains, superheterodyne receivers.

L. EASTWOOD, Radio Manufacturers Consultant, late of His Master's Voice and Marconi's Wireless Telegraph Co. Phone: Clerkenwell 7693. Address: 70, Pitfield St., Great Eastern St., N.1. [0404]

METROPOLITAN RADIO SERVICE Co. Specialise in Repairs to British and American radios; transformers rewound; guaranteed workmanship.—1021, Finchley Rd., Golders Green, Speedwell 3000. [3992]

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HAVE YOU HAD OUR NEW ART CATALOGUE "W"?

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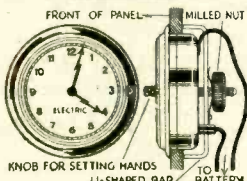
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ALL Rich & Bundy Mains Transformers for Radio are fitted with screened Primary. We welcome specialist work.

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FIT THIS ELECTRIC CLOCK TO YOUR SET? NO MAINS NEEDED! KEEPS CORRECT TIME! NO WINDING!

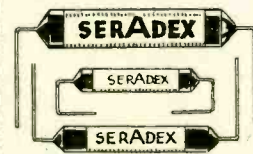
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Supplied, Serviced and Visited in any district or may be sent for Full Test and Report, at 2/- per valve-holder; portables 1/6 per valve-holder.

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GUARANTEED Repairs by Experts, specialists for repairs to S. G. Brown and Amplion radio apparatus, also loud speakers, headphones, pick-ups, Blue Spots, any type rewound, remagnetised and adjusted, 4/-; post free; mains transformer repairs; terms to trade.—Howell, 91, Morley Hill, Enfield, Middlesex. [9716]

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RYALL'S RADIO, 33, Chancery Lane, London, will accept modern parts and sets in part payment for brand new; we also purchase approved parts for cash; quotations given by post only, provided stamped, addressed enclosed. [4113]

HIGH Allowances Made on Second-hand Goods in Part Payment for New Sets of Components; easy payments available; we have tremendous stocks tested second-hand goods; send list of your requirements for quotation.—Bostock and Stonnill, 1, Westbourne Terrace, S.E.23. [4314]

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WANTED, cheap for cash, Baker or Epoch super power energised moving coil.—Parker, Longpool, Kendal. [4301]

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YOUNG Men Trained for all Branches of the Wireless Profession in Britain's Leading College; training fee can be paid after appointment secured; students accepted as boarders; London representative available for interviews. Prospectus free.—The Wireless College, Colwyn Bay. [0388]

BOOKS, INSTRUCTION, ETC.

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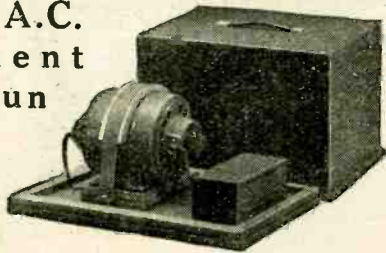
THE Wireless World" Diary for 1934 contains, in addition to the usual diary section, 78 pages of facts, figures, and explanations, including circuit diagrams of complete receivers and details of receivers; size 4 1/2 x 3 1/2 in., bound leather cloth; price 1/6 net, by post 1/7, from the Publishers, Hiffe and Sons, Ltd., Dorset House, Stamford St., London, S.E.1. [0403]

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"The set, of course, is built for the ordinary alternating current, but I happen to be on direct current mains. The hiatus was overcome for my tests by a converter supplied by the Electro Dynamic Company. This perfectly constructed piece of machinery has not given the slightest trouble. The intake is 220 volts D.C. and the output 238 volts A.C., and when it is added that the motor and dynamo forming the unit have been standing on the ground less than 18 inches from the 'radio gram' without creating a suspicion of hum or crackling noise, it will be realised that here is a very fine piece of electrical apparatus. I gladly make the acknowledgment."

D.C.—A.C. CONVERTER

Price from £6-10

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Defeats interference by electric motors, trams, domestic appliances, etc., which often render reception impossible without a noisy background. Consists of a screened downlead with impedance matching transformers at each end. Entails only slight alteration to existing aerial.

Price complete Kit, including 50 feet of screened cable, £2-5-0.

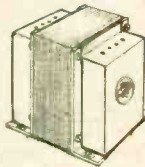
See Full Report "W.W." Nov. 10th, Page 383.

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SPECIFIED FOR THE A.V.C. STRAIGHT FOUR
BRYCE MODEL A.B.573/C. TRANSFORMER

Best Quality Materials, subject to 10,000 v. Insulation Test, and 4 Independent Meter Tests, Low Magnetising Current. GUARANTEED 5 YEARS. Price 50/-



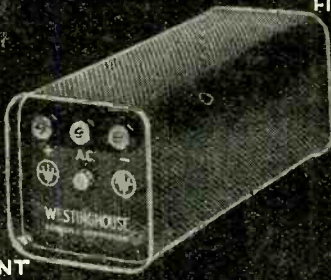
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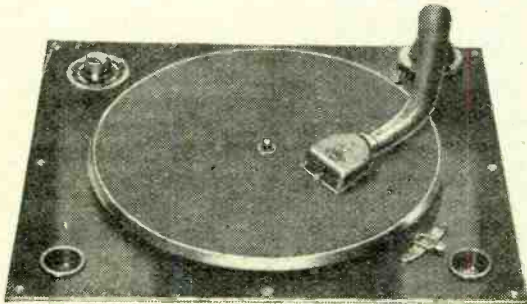
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Send 3d. to Dept. "WW" for a copy of "The All Metal Way, 1934."

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THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD.,
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At small cost you can convert your set into a modern radio-gram with all the advantages of gramophone reproduction with radio amplification. Garrard Motor, turntable, combined pick-up and tone arm, needle-cups (and volume control if required), are fitted to a bronzed-steel unit plate which ensures simplicity of fitting. Electric models are suitable for 100 to 130, and 200 to 250-volt mains, and spring models are unusually silent in operation.

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 SWINDON, WILTS; 17, GRAFTON STREET, LONDON, W
 Swindon 534 & 535 (2 lines). Regent 7596.

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The only complete FACTORY MATCHED Super-Het Tuning Unit

THE unit comprises CONSTANT, AERIAL COUPLING coil, R.F. inter-valve coil and oscillator coil, special super-het 3 ganged condenser the oscillator tuning section having "shaped" tracking vanes ensuring matching over the whole wave-band. The R.F. Super Radiopak is matched within 1/2 of 1 per cent. before despatch. One has only to balance out the stray circuit capacities with the aid of the trimmers conveniently provided at the top of the Unit to ensure permanent MATCHED PERFECTION.

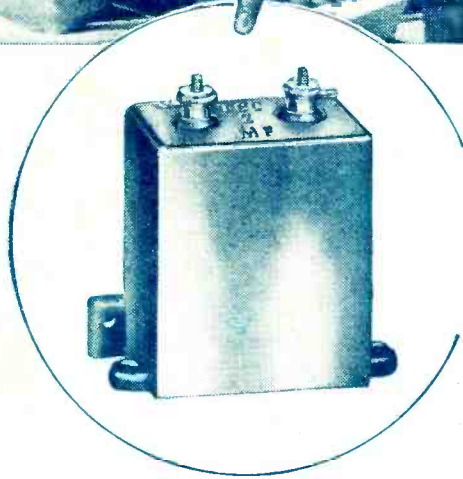
A PADDING CONDENSER is incorporated to balance the tuning on the LONG WAVE-BAND. PRICE SUITABLE FOR I.F. of 110 K.C. The scale is calibrated in Wavelengths. 200-550 m. 800-2,000 m. **75/-**

SPECIFIED EXCLUSIVELY for the W. W. EVERYMAN A.C. SUPER

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