

WORLD-RADIO

DOMINION & FOREIGN PROGRAMMES

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Journal of the B.B.C.

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FRIDAY, FEBRUARY 6, 1931

Two Pence

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WORLD-RADIO

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TWO PENCE

Is Foreign Listening Worth While?

DURING several weeks past we have printed a considerable number of letters dealing with the above subject in which the writers have expressed their views more or less emphatically.

While the *consensus* of opinion expressed by these letters is undoubtedly that the question should be answered in the affirmative, the arguments of those who put forward the contrary view are undoubtedly entitled to respect. They maintain that it is impossible to listen to most foreign stations for any length of time without some form of interference or fading; that the quality of the transmissions compared with those of the British stations, leaves a great deal to be desired; that, on tuning in to a certain number of stations, the majority of these will be found to be broadcasting, in some form or another, speech which cannot be followed by most listeners. And all those of this way of thinking unite in condemnation of the mere "knob-twiddler."

On the other hand, those readers who consider foreign listening well worth while contend that, however much they may like parts of the British programmes—and, for the most part, they are generous in their recognition of what they claim to be the general superiority in quality both of transmission and programmes—there are many times when they desire such an alternative as can be provided by stations on the Continent. They say, in truth, that, owing to the high power of many of these stations, they are able to listen with a good deal of enjoyment to transmissions, it may be, of opera, or of other favourite forms of music, during a considerable period of time and more or less without serious interruption. There are those, of course, belonging to the category of "knob-twiddlers," who apparently enjoy a complete evening of "samples" of foreign transmissions. After all, so long as they do not interfere with the serious enjoyment of their neighbours, they are clearly entitled to their fun; but this does not, of course, constitute foreign listening. One correspondent seemed to sum up the reasonable view on this subject in saying that the best method for those who listen seriously is to take the whole of the programmes, British and foreign, and to pick out therefrom, on a given evening, those items which most appeal to them, with due regard, of course, to the power and quality of the stations to which they propose to listen.

An important point raised in a number of letters is that of the quality and suitability of the receiving set. The importance of this can hardly be exaggerated, and in these days of efficient components at low prices there seems little excuse for attempting too much with inefficient sets.

One aspect of foreign listening, which has achieved an unusual prominence during the

past weeks, is that of reception of United States stations. In a sense, this reception belongs to a category of its own, since, while it possesses an undeniable interest—even, perhaps, fascination—it has little programme value as yet. It may be, however, that, with continued improvement in reception conditions as well as in receivers, programme items of educational and cultural value in such transmissions will come to be added to those which should take a regular place in the carefully-drawn-up plan of a late evening's entertainment.

The correspondence on this important subject may be said to have served a useful end if it has done no more than emphasise the interest, amusement, and distinct educational advantages to be derived from sane and careful foreign listening.

Those Foreign Stations

By "THE SEARCHER"

AS what may, I suppose, be called a professional foreign listener, I have found particularly interesting the correspondence on the reception of distant stations which has been running for some time in the columns of *World-Radio*. It is quite clear that opinion amongst readers is sharply divided; some of them claim that, taken all round, foreign stations are scarcely worth tuning in, whilst others are equally emphatic in maintaining that genuine entertainment can be obtained from the programmes of places hundreds of miles away. In my view, those who take either side in the discussion may be at one and the same time perfectly right and perfectly wrong!

You know the old question: "Is life worth living?" and the answer: "It all depends upon the liver." Well, so far as long-distance work is concerned the question is: Are foreign stations worth receiving? and the answer: It all depends on the receiver. And that is a point that is missed by a great many of those who take part in the correspondence.

You can receive quite a number of the more powerful European stations with a set of the o-V-2 or the 1-V-1 type at good loud speaker volume. But with such sets, as well as with a good many containing two not very efficient high-frequency stages, a great deal of reliance must be placed on reaction. Now reaction, though it can be a very good friend, is an exceedingly bad master, and it is a great pity that so many of the sets in use at present for long-distance work require a great deal of use to be made of it.

Let us consider for a moment what reaction does and what its effects upon the output of the set may be. As is well known, the basic principle of reaction is to counteract damping by means of controlled feed-back from the plate to the grid circuit of one valve (usually the detector) in the set. The first and most attractive point about reaction is that it enormously increases both the sensitiveness and the selectivity of a receiving set. In conveying this boon, though, it exacts more than its pound of flesh.

The detector is from the nature of its duties by far the most prone of all the valves to produce noisiness. Tap your valves one by one, beginning from the high-frequency end. In most cases there will be little or no response from the loud speaker except when the detector is so treated. Tapping this valve usually causes the loud speaker to emit "pings," and the response becomes greater as the reaction coupling is tightened. With reaction arranged between the plate and grid circuit of the detector, all noisiness due to defects in batteries or wiring or to mains hum is brought out; moreover, the set is in a condition peculiarly susceptible to "mush" and other outside causes of interference.

There is, too, another point of very great importance. Take the case of a station which is fading at intervals to half its normal strength. During a minimum period of signal strength the plate output of the detector may be only a quarter of what it is during a maximum period, in which case there will be a huge falling off in the anti-damping effects of reaction and the set exaggerates the variations in signal strength. In a word, the more you rely upon reaction the more are you likely to be bothered by variations in the loud speaker output when receiving foreign stations.

Reaction, after all, provides what may be termed spurious high-frequency amplification. What is required for the best long-distance results is genuine high-frequency magnification or intermediate frequency in the case of the super-heterodyne by means of suitable valves and circuits. As a result of long experience, I am absolutely convinced that there is hardly a foreign station worth listening to unless one good stage of high-frequency amplification is employed, and that to hear well a large number of such stations so much high-frequency amplification is required that reaction may be almost if not entirely dispensed with.

Long-distance enthusiasts would find foreign listening better worth while if they would realise the limitations of their receiving sets—and if they would provide the reaction knob with a stop which prevented the set from ever being brought anywhere near the super-sensitive condition which obtains just before the point of oscillation is reached. If you cannot get Vienna on the loud speaker with your reaction coupling far from the point which causes oscillation, then Vienna is definitely outside the proper range of your set.

May I say that in my reports no station is ever referred to as providing good reception unless it is entirely free from interference. Some correspondents have suggested that as a bee flits from flower to flower, so I am in the habit of spending my evenings in travelling round Europe, culling a bar or two of music from this station and a word or two of speech from that, but never pausing long enough to hear a complete item from any station. Here actually is the way in which reports are compiled. The big set which I generally use is calibrated "to a hair," and every station in Europe with a wavelength of its own is within its compass. Any of them can be found in about ten seconds, so that half an hour early in the evening suffices to see how stations as a whole are being received.

This first exploration is usually made just at dusk. Later, for a period which varies from one hour to three, I select attractive items from the programmes published in *World-Radio*, and listen to them in their entirety from stations that are coming in well. A short time during the evening may be, and often is, devoted to new stations or to old ones whose strength is in the habit of varying from night to night.

In addition to high-frequency amplification there are other factors which have a very great bearing upon success in the reception of distant stations. One of these is selectivity, and here, again, we must hark back for a moment to reaction. The very worst type of selectivity is that obtainable by means of reaction feed-back, for this leads inevitably to the kind of distortion which gives what I call "woomfy" reception. Where there is ample high or intermediate frequency amplification, precautions can be taken to ensure that, though the selectivity is high, no such distortion is introduced. The higher the selectivity the smaller is the liability to interference from "cross talk" and other sources, but special design is required to see that high selectivity is not detrimental to quality.

One way in which a set with plenty of amplification before the detector may be made more selective is to use a frame aerial instead of an outdoor collector, or even a wire suspended in an attic or near the ceiling of a living room. Owing to its directional properties, the frame frequently enables many interfering signals to be cut out, and not the least of its advantages is that it is less susceptible than are most other collectors to shock excitation by atmospheric and spark signals.

This, then, is how I would sum up the position as regards listening in this country to foreign stations. The number of these which can be received in such a way that their programmes are genuinely worth listening to is surprisingly large if the receiving set has good high-frequency amplification and the highest selectivity consistent with quality. With a set of comparatively small high-frequency amplifying powers whose selectivity is only of a moderate order, a big "bag" of foreign stations may be obtained on favourable evenings with the aid of reaction pressed considerably beyond the point at which quality begins to suffer. In fact, once the user of a small receiving set goes outside a mere handful of very powerful foreign stations, such as Radio-Paris, Rome, Stockholm, Strasbourg, Heilsberg, and Nürnberg, he must almost inevitably find that the output from his loud speaker is of very inferior quality. The stations mentioned, though, give him a very fair choice of alternative programmes, and if he will concentrate upon these with a view to obtaining the best possible quality from them he will, I feel sure, come to the conclusion that such foreign stations as are within his range are really worth hearing. It may be taken as a golden rule for long-distance reception that no foreign stations will ever be worth listening to from a purely entertainment point of view if the receiving set has to be "pressed" in order to bring the volume up to loud speaker strength.

Do not take it that I am counselling the man with only a small number of valves at his disposal to regard foreign stations as entirely outside his scope. The point that I want to make is perhaps best illustrated by a simile. A baby car furnishes a handy and comfortable means of transport from place to place, so long as its limitations are realised. It would cease to be comfortable or reliable if five heavy passengers and their luggage were crowded into it—though such a load is well within the powers of a big car.

Find the foreign stations that your own set can bring in faithfully and well, and confine yourself to their transmissions. If you are prepared to employ a large number of valves with up-to-date circuits, conditions are altogether different.

From the Swiss Alps

A Review of the January European Programmes

By "YODELLER"

JANUARY in the Alps has been a very pleasant month. We have had plenty of sunshine, an occasional fall of snow, just enough to keep the streets white, and many exceedingly cold, but dry and bright days. For the last three or four days of the month a blizzard has been raging, and snow is piled higher than our window-ledges. It is only with the utmost difficulty that we can keep the doorway of our chalet clear enough to allow ourselves room for entrance and exit, and in the streets there is a white bank shoulder-high on either side, and a six-horsed snow-plough has to be kept going all day long to keep even this passage-way clear. I am told that if the snow does not soon cease, there will be immediate danger of avalanches coming down off the mountain top on to our village. This is not exactly a comfortable thought, but we are fairly well protected by the pine forest at our back and a rising shoulder of the mountain—and, thank goodness, I notice that the barometer is rising, which indicates a "let-up" of the blizzard.

My January wireless notes contain a queer *mélange*, and my only regret is that space does not permit a mention of everything that the "ether" brought me.

Thursday, January 1.—The first items noted in the dawning year were bells, from the different countries, immediately after midnight of the old year. But the first official programme I heard was, fittingly enough, a very fine version of Wagner's *Die Walküre*, as relayed from the National Theatre, Munich. One revelled in the way in which the marvellous orchestra supported the almost perfect company of artists.

Friday, January 2.—Tried Mühlacker for the Schubert concert which this station promised us, and spent some time listening to the famous *Rosamunde Overture*. Finally, albeit much to my regret, I had to give up owing to interference from Graz and a persistent heterodyne note which absolutely ruined the transmission.

Sunday, January 4.—Struck a wonderful concert which was being relayed from Munich by Königs Wusterhausen. Thoroughly enjoyed the superb soprano's rendering of the aria from Götz's *The Taming of the Shrew*.

Tuesday, January 6.—Leipzig which, these days, is one of the most reliable stations on my log, gave us an excellent pianoforte recital from the works of Chopin, the pianist being Edeltraut Eiben.

Wednesday, January 7.—Found myself seated, as it were, in the front row of the stalls in the Royal Hungarian Opera House, Budapest, listening to the charming airs and music of *Il Trovatore*.

Thursday, January 8.—As so often happens with Rome, found this station had made a last-minute change in its arrangements, and instead of a variety concert it was putting out the *Faust* of Berlioz. I must say that this alteration was very much to my liking.

Saturday, January 10.—I notice that many Continental stations make a feature of broadcasting long excerpts from the latest "talkies," and on this occasion, I heard some rather charming music from one of the latest "hits" (the name of which I missed) from Vienna.

Sunday, January 11.—Spent the evening *chez* Budapest, listening to a relay from Prague of a concert from the Smetana Hall of the works of Berlioz, Smetana, and Beethoven. The orchestra was the famous Czech Philharmonic, of which I don't think I am exaggerating when I say that it is amongst the world's best orchestras. A truly great evening.

Tuesday, January 13.—*Hänsel and Gretel*, from Copenhagen, *Tales of Hoffmann*, from Vienna. Which to choose? Starting at Vienna, I managed to get in Acts I and II of Offenbach's charming operetta, then turned to Kalundborg, hoping to hear the relay of *Hänsel and Gretel*, but instead found only speech coming through. Gave my knobs a "twiddle" and found myself at Oslo, and here I remained listening to an orchestral concert, the Ballet Music from Halévy's *La Juive* being particularly appreciated.

Wednesday, January 14.—Turned to England for the B.B.C. Symphony Concert from the Queen's Hall. Halfway through, I suddenly dropped down to Vienna, being somewhat anxious to see how the Austrian transmitter was dealing with the relay of the English concert. Much to my patriotic delight, I found the relay coming over with marvellous fidelity, quite as perfectly as was the original from Daventry. Schubert's Seventh Symphony, in the second half of the evening, was heavenly, and I feel sure that British musical stock must have soared skywards with a tremendous leap, thanks to the way in which our orchestra was relayed throughout Europe!

Sunday, January 18.—Dropped in on the Poulet Concert which was being transmitted from the Sarah Bernhardt Theatre, Paris. One could not fail to enjoy the orchestra's fine rendering of Beethoven's *Pastoral* and Mendelssohn's Concerto in G Minor for Piano and Orchestra.

Thursday, January 22.—Vienna advertised a recital by Elizabeth Schumann, but on tuning-in I found it giving out an orchestral concert.

Saturday, January 24.—Heard one of the best broadcasts of the month—namely, Mozart's *Magic Flute*—from Königs Wusterhausen. The "bass" was magnificent.

Monday, January 26.—Picked up a quaint concert from Langenberg. It was termed "People's Music" and consisted of songs to the lute accompaniment, bagpipe music, and accordion solos.

Tuesday, January 27.—The 175th anniversary of Mozart's birth. As advised by "Etherviator," I decided to pay a call on Vienna in order to sample the delights of the great composer's *Don Juan*. I must say that the advice was good. The celebrated State Opera Orchestra and the artists gave of their very best in a performance which was beautiful beyond all imagining.

Summary.—Except for the last three days of the month, atmospherics have been only remarkable for their entire absence. Listening has at all times been a pleasure, and, save that a number of stations can no longer be relied upon to give reception without interference from their powerful neighbours, I have few complaints to make.

I seldom listen now to either the Midland Regional or the London Regional, as these stations have become frankly impossible, much to the regret of all "exile" Englishmen. The long-wave Daventry and the London National, however, are much better than they have been for nearly a year, so that one must seek compensation in this.

Oslo is a wonderful signal nowadays, and its purity and tone are remarkable. On two or three occasions I have had Moscow Trades Union with the power of my local station, whilst Motala, the Eiffel Tower, and Königs Wusterhausen can always be relied upon.

Milan has not been so strong as it was, whilst Vienna is curious in that on one night it gives perfect reception, very loud and without fading, whilst the following evening it becomes most unreliable, and fades out to nothing at the slightest provocation. I find, too, that at times Brussels comes up out of the background with a roar and almost drowns the Viennese signal.

Via Ether

International Hungarian Evening

THE outstanding event in the coming week's programmes is the Hungarian National evening on WEDNESDAY, February 11. The concert, which will be broadcast at 7 p.m. from Budapest, will be conducted by the eminent Hungarian musician, E. von Dohnányi, and will consist of Liszt's stupendous work, *The Dante Symphony*. It is to be relayed by a number of European stations, including the London Regional transmitter. I have never heard this composition, though I have read a good deal about it. I am, therefore, looking forward to its performance with no little interest. The symphony concert will be followed by the Imre Magyari Cigany Orchestra's rendering of Hungarian airs. There are several stations, such as Munich and Mühlacker-Frankfurt, which have arranged their own Hungarian programme for Wednesday night, and others again, such as Rome and Copenhagen, which are doing so on THURSDAY evening.

Ernst von Dohnányi

THE name of Dohnányi frequently appears in the broadcasting programmes, especially in those of the Budapest station. The Philharmonic Society's concerts, usually conducted by him, are often relayed. It may, therefore, interest readers to hear that he has just accepted the position of Director of Music at the Budapest station. Apart from being a noted orchestral conductor, he is a great pianist, who, in the years before broadcasting, toured the world as a *virtuoso*. Dohnányi has also written a number of compositions for the orchestra, piano, and the stage, and I see that on THURSDAY evening—no doubt in honour of the International Hungarian evening—we are to hear his *opéra bouffe*, *The Tenor*. Hamburg is relaying this work from the Hanover Opera House. The story of the opera is a very simple one, and describes scenes in the life of the people; the "Tenor" is not the proverbial tenor of Grand Opera, but of a small choral society.

Lessing and Wagner

Two anniversaries which fall during the next week will be commemorated by a number of stations. The 150th anniversary of the death of one of Germany's greatest writers, Gotthold Ephraim Lessing, will be remembered by Langenberg on FRIDAY next with a broadcast of *Minna von Barnhelm*. Lessing was a writer and thinker whose influence has been felt far beyond Germany's borders. The play which, however, shows us Lessing, the man, to an even higher degree, is *Nathan der Weise*, a work full of noble thought. He here compares the world's three monotheistic religions, and states that they are of equal value, since the underlying truth in each of them may be summed up in the words, tolerance, humanity, love, and the purest morality. Richard Wagner died on February 13, 1883. The anniversary will be commemorated by several stations. Thus a Wagner concert will be broadcast from Copenhagen at 7 p.m. on WEDNESDAY, and from Berlin, Leipzig, and Heilsberg at 6.30, 6.45, and 8.10 p.m. respectively on FRIDAY. The Berlin concert will be preceded at 6.10 p.m. by a talk on the composer.

When is a Noise Not a "Noise"?

A FEW months ago I expressed my surprise at the report that, as a result of a test at an American University, students were found to be able to concentrate on their studies better when listening to jazz music than when silence prevailed. A correspondent joins issue with me in this matter. "To me," he says, "this seems quite easily explainable, and in fact I myself do a great deal of study under these conditions. First of all, what are the ideal conditions for studying or mind concentration? One of the main things is that there shall be no disturbing or distracting influence. A small noise in a silent background is a disturbing influence. A small noise in a background of fairly continuous sound is not a disturbing influence, providing that your ears will accustom themselves to the continuous sound. For instance, how many people hear their own clocks ticking away? A workman in a factory is often unconscious of the sound of the machinery, although a visitor cannot hear himself speak. Now to come back to our students. Imagine them studying in a room that is absolutely quiet. A mouse enters and nibbles the boards. The students' minds immediately side-track to discover the origin of the sound. A heavy lorry next passes by in the street, perhaps shaking the furniture. Their minds automatically reason out what is happening, so that subconsciously they know that the heavy lorry has passed near their door. All this side-tracking of the mind is evidently lessening the concentration of the mind on the subjects that our students are studying."

Soothing Jazz

"Now in the same room a loud speaker is gently diffusing jazz music—not blaring, mind you, for that would probably defeat the whole object. At first the students would probably forsake their studies altogether, then they would discuss the music amongst themselves. This is the first step in not hearing the jazz. In talking, their minds begin to accustom themselves to ignoring the music whilst concentrating on the hearing of speech from their fellow-students. After perhaps a fairly long discussion they restart on their studies. Their minds by now are accustomed to the sound of the dance music, promptly forget all about it, and concentrate on the problem in hand. Presently in comes our mouse, nibbles the same piece of wood, produces exactly the same noise, but it does not distract the attention of the students, because the jazz is hiding or masking the sound. The lorry also passes by unnoticed for the same reason, and, therefore, a greater number of our students' problems are worked out in a given time. Now this result will nearly always work out when the student has become used to the sound of a particular make of loud speaker. It may not work out with your friends' speaker at first, because your mind is probably comparing the quality and values of sound and reproduction. Also, jazz music answers best for this purpose, as it is a fairly continuous sound (I nearly said noise). Other music is not so good, owing to the greatly varying strength or intensity. Singing also fails for the same reason." Well, I can only suppose that I

have not given jazz a fair chance. Anyhow, it would be interesting to hear the experiences of others on this subject.

Compulsory Educational Broadcasting

SENATOR FESS, who has just introduced into the U.S. Senate a Bill to make educational broadcasting compulsory, must be a bold man. "Not less than 15 per cent. of the radio broadcasting facilities which are or may become subject to the control of the Federal Radio Commission shall be reserved for educational broadcasting exclusively"—so runs the text of this drastic little Bill, which, so far as we are aware, has no parallel in any other country. The Bill, of course, stands little chance of becoming law; and if it did, there is a significant omission which would make its application difficult—no mention is made of where the money to pay for the educational programmes is to come from. The Bill is to be regarded as the first-fruits of a campaign just launched by the National Committee on Education by Radio, which was formed last October. This committee represents an alliance between the college and university broadcasting stations, the National Education Association, and the U.S. Federal Bureau of Education. It is apparently quite distinct from the National Advisory Council on Radio in Education, which came into being about the same time and was promoted by the American Association for Adult Education, with financial backing from the Carnegie and Rockefeller foundations. So now there are two committees in the States to carry on the campaign. They are laying their plans, we hear, for a "five-year programme for the protection and promotion of education by radio"—the word "protection" implying resistance to the tendency now at work to squeeze college broadcasting stations "off the ether" altogether.

A Determined Taxpayer

It is not generally known that a law exists in France already under which every possessor of a wireless set must make a declaration at the post office and pay a tax of sixpence. A correspondent writes to me of one honest listener who described to him his recent experiences while endeavouring to pay this imposition. The girl who attended to him informed him that he was the first person to ask for a declaration form during the two years that she had been at the post office. After making a thorough search she consulted a senior colleague, who likewise made a search with equal success. One of the chiefs was then called in, and a further search was made, with a like result. The would-be taxpayer was then requested to call again in a few days' time, when the form would be available. This, I understand, he intends doing, and declares his determination to pay the tax, even if he has to visit all the 128 post offices in Paris! There are, I am told, cases of listeners who have paid the tax, but they are very few in number, and no cases are known of any listener getting into trouble for not paying. I hope that by giving publicity to the difficulty of thus parting with "saxpence" in Paris I have not encouraged a wholesale exodus from Scotland.

ETHERVIATOR.

Dominion and Foreign Broadcasting Intelligence

CANADA

NBC Programmes for Montreal
(From a Correspondent)

After lengthy negotiations, programmes under the jurisdiction of the National Broadcasting Company of the United States are now being relayed to Montreal and Eastern Canada through the Canadian Marconi station CFCF. These programmes will be broadcast during the morning, afternoon, and evening sessions. Through this new service Montreal listeners now receive programmes emanating from the two great chains, the NBC over CFCF, and the Columbia Broadcasting Company over CKAC, *La Presse*. This makes the second Canadian station to become associated with the NBC, CKGW having taken the network programmes for a year.

AUSTRIA

(From our Vienna Correspondent)
U.I.R. Conference

The exceptional importance of the half-yearly conference of the U.I.R., which opened at Semmering on Monday, February 2, is [due to the fact that the discussions of the Technical Delegations, which will occupy the whole of the first five days, will largely determine the readjustment of wavelengths at the next session at Madrid, and, indeed, the present situation] has become so acute—with the erection of high-power stations in various parts of the world, and the expectation that still more powerful stations will soon be operating—that decisions may be accelerated, for chaos in the ether appears to be imminent unless prompt action is taken. Semmering itself is in Styria, of which Graz is the provincial capital, and the recent exchange with London of wavelengths showed that the powerful Mühlacker station, which is 350 miles from Graz in a straight line, choked Graz altogether outside a radius of about 30 miles, so that Semmering, for instance, could not hear Graz clearly.

Programme Changes

The opera composed by Paul von Klenau, with a libretto by Rudolph Hoffmann, based upon Sheridan's *School for Scandal*, and entitled *Die Lästerschule*, which was to have been given in the Ravag studio on Tuesday, January 20, had to make way on that evening for a relay of *Viktorja und ihr Husar* from the Theater an der Wien. It was then announced for Friday, the 23rd, but instead we had the *Merry Wives of Windsor* opera from the studio. It has now been indefinitely postponed, because the State Opera cannot give permission to indispensable singers to attend at the Ravag studio on any particular evening, as so many members of the State Opera have been, or are being, attacked by influenza that no leave can be granted at present. The performance of this "comic opera," as it is styled, will therefore probably not take place till the end of February, at the earliest. Boccaccio will be broadcast on Friday Feb. 6, instead of on the 7th, on which latter date *The Opera Ball*, by Heuberger will be relayed from the State Opera. On Thursday, Feb. 12, at 7.5 p.m., we are to have in the studio a performance of the operetta *Theresine*, by Oskar Straus, who has just returned to Vienna from America.

FRANCE

(From our Paris Correspondent)
New Minister for Posts, Telegraphs, and
Telephones

Since the Broadcasting Bill was introduced by M. Germain Martin a little over eighteen months ago, there have been several changes

in the Government, although sometimes a Minister has served in two consecutive Governments, generally with a change of office. The Ministry of Posts, Telegraphs, and Telephones has seen M. Germain Martin succeeded by M. Mallarmé, who in turn was followed by M. Georges Bonnet. The Cabinet to which the latter gentleman belonged had only a short life, and his successor is M. Charles Guernier, who, it is hoped by listeners of all parties, will have the honour of piloting the Bill through Parliament. It is not because listeners have more confidence in M. Guernier than in his predecessors that they wish him to have this honour, but because they want the Bill passed as soon as possible, and every change in the Cabinet means more delay. Actually little is known about M. Guernier's attitude in wireless matters.

Notable Transmissions

Two transmissions that have received very favourable comment in France are the German play, *S O S*, by Doctor Frederic Wolf, the French translation of which was produced by Radio-Paris on Thursday, January 29, and *Going South*, which was produced by Daventry National on Saturday, January 24. Both productions were considered very good examples of radiophonic art, and useful models as a basis for its development.

New Laboratory for Professor Branly

Thanks to the generosity of several benefactors, amongst whom is a well-known scent manufacturer and politician, the Institut Catholique de Paris is providing in its new buildings a laboratory and a skilled assistant for Professor Branly in order to enable him to continue his wireless researches. There will also be a Branly Museum, where the famous "coherer" will be on exhibit.

HOLLAND

Education for Canal Workers
(From our Correspondent at The Hague)

For the first time since the present arrangements with regard to the division of time among the various broadcast organisations came into force, the Minister has just allotted to a "*bijzonder omroepvereniging*"—that is, a broadcast society with specialised objects—a share of the available time. The society is that which has as its object the provision of educational facilities for the families of men employed on boats sailing on inland waters. The broadcasts should have begun on October 1, but it has only now been possible to make the necessary arrangements. One particular request of the society was that they should be allotted time on "general evenings," so as to ensure that practically all would be listening, for on "special evenings" those who were not interested in the special subjects would not be using their receiving sets, or would be switched on to foreign stations. The decision of the Minister is that, for the present, each of the four general broadcast societies must give up to the shipping people half an hour per week between the hours of 6 and 8 p.m., and an arrangement has been made whereby the broadcasts will take place alternately on Tuesday and Wednesday evenings. They will be of an educational character, particularly suited to young people whose home life prevents them attending day or evening schools regularly.

POLAND

(From our Warsaw Correspondent)
Miss Amy Johnson Broadcasts from Warsaw
While staying in Warsaw on her "compulsory sojourn" at the beginning of January last, the

well-known British airwoman, Miss Amy Johnson, was invited by Polskie Radio to deliver a short talk before the Warsaw microphone. Miss Johnson accepted the invitation and broadcast on January 8 at 4 p.m. G.M.T. She told listeners why and how she "had to come down from heaven" on the fields of a Polish village of Amelin, which is sixty miles north-west of Warsaw; also how lucky she was in landing, and how glad to discover that one of the villagers spoke English. She said everyone there was good and kind to her, especially the police. Proceeding, she thanked the Civil and Military air authorities in Poland for the assistance and care offered her and her aeroplane. In conclusion she said that while giving up temporarily a further attempt to fly to Peking, on account of the weather conditions, she hoped to resume her efforts some time in the coming summer. Her talk was translated immediately by the *World-Radio* Correspondent in Warsaw.



Miss Amy Johnson at the Warsaw microphone, with the translator of her talk

A Quarter of a Million Subscribers

According to the figures registered on January 1, 1931, the broadcasting subscribers for all Polskie Radio stations reached the total of 243,505. It was expected, however, that by February 1 the licence figures would exceed 250,000. It is anticipated that with the opening of the new 120-kW transmitter in Raszyn (a suburb of Warsaw) the number of the new registered listeners will, at first, exceed 200 per day.

U.S.A.

KDKA: Proposed Power of 1,200 kW

Broadcasting power of 1,200 kW is the goal of Station KDKA, whose engineers are now conducting experiments with the new 200 kW valves in the expectation of transmitting shortly a series of after-midnight tests with super power (about 6 a.m. G.M.T.). Station KDKA's experimental licence from the Federal Radio Commission authorises the use of up to 400 kW in the series of experiments. This will require the use of two of the giant 200 kW valves, each of which stands six feet high and requires the passage of five tons of cool water through its jacket every hour. It is learned on reliable authority that the engineers are arranging the plant of KDKA so that six of the giant valves may ultimately be used, which would give the station an output of 1,200 kW.

Letters to the Editor

(Correspondents are requested to keep their letters as short as possible and, in the case of the use of pseudonyms, to give their names and addresses.)

Identity Announcements and the Average Listener To the Editor of WORLD-RADIO

SIR,—It seems to me that all your correspondents who advocate listeners making their own calibration charts—and quite rightly, too, for how can one manage without?—are working on the totally erroneous assumption that the majority of people are capable of so doing, but this is by no means the case. A vast number cannot even read! The replies in the "Which Station Was That?" column prove this. Week after week the inquirers are piteously reminded, "Please number your queries;" "Proprietary names must not be used," and "Coupon must be sent with each inquiry;" and the simple instructions stare one in the face in clear print. How can one expect such people to make a chart for themselves?

Yours faithfully,
COMMANDER, Royal Navy
(Retired).

To the Editor of WORLD-RADIO

SIR,—If your correspondent, J. J. R., as an average listener, seriously prefers the charm of Hungarian, which he cannot understand, to the "boredom" of Esperanto, which he could learn to understand with reasonable effort, one can only conclude that to the average listener international radio is a mere toy.

Surely a few people may be pardoned for wanting to *understand* what they hear?

Yours faithfully,
FRED E. WADHAM.

West Croydon, Surrey, Jan. 30, 1931.

Is Foreign Listening Worth While?

To the Editor of WORLD-RADIO

SIR,—I have read with great interest the letters for and against foreign listening, and feel I must say, in my case, that this is absolutely worth while.

Last night I took *The Magic Flute* from Berlin, and could follow the text better than many B.B.C. productions.

I have a portable at present, and it has sixty-seven stations to its credit, and only the frame aerial used. I depend chiefly on two or three German stations, Rome, Katowice, Prague, Stockholm, Kalundborg, and Milan. I can also get Lahti, Riga, Moscow, and Rennes, the latter as strong as the London National low wave. These stations very rarely fade.

My advice to every would-be foreign listener is—Get to know your set and its behaviour before you start foreign listening: half those who grumble probably don't know the capabilities of their sets; also, if one knows one foreign language, here is a splendid way of keeping it up, and by degrees one gets to understand others.

Yours faithfully,
(Miss) D. E. PRITHI.

Hambledon, Hants, Jan. 25, 1931.

To the Editor of WORLD-RADIO

SIR,—My experience during the last twelve months with a hand-made set (2 HF-Det.-2 LF) may be of interest to your readers.

I have brought in almost every station between 600 and 230 metres at good quality L.S. strength at various times. 600 metres is the top limit of the set.

I have never yet found a station which did not either fade or distort, including even 5GB.

Barcelona EAJI is the only station from which I can get pure reception at any time, and when the signal is weak it can stand being "boosted up" without distortion.

One hour after sunset is my best time for signal strength and absence of interference.

Mr. J. Chandler must be lucky to receive

without fading the seven medium-wave stations he mentions in his letter. After London National these are some of my worst faders.

I am of the opinion that even with the best of sets good reception is entirely a matter of luck.

Yours faithfully,
OLIVER GLYDON.

Handsworth, Birmingham, Jan. 25, 1931.

To the Editor of WORLD-RADIO

SIR,—Will you please allow me a little space to congratulate Mr. J. Groom on the wonderful skill he has attained in twelve months if he has been able by the use of his rejectors to overcome atmospheric on the high wavelengths and fading on the low wavelengths, to say nothing of the howls produced by oscillators.

I have been a licence-holder for ten years, but up to the time of writing I have been unable to overcome these troubles, so conclude that I must be numbered among the "poor fish" Mr. Groom speaks of.

At the present moment I am using a 4-valve set, 1 HF neutralised triode, det. (anode bend), and 2LF. This type of set I have found to give the best all-round results consistent with economy, but out of about sixty or so stations that I am able to tune in, like Mr. Edwards, I seldom find more than four or five stations worth listening to, and then the music is often gramophone music, which even the B.B.C. are unable to disguise as the real thing. Then again, the foreign stations seldom give more than an hour's programme that is not interspersed with talks, announcements, sports notes, news, or weather reports, in a language that is quite unintelligible to listeners in this country.

Yours faithfully,
S. A. KEES.

Upper Holloway, N.19.

To the Editor of WORLD-RADIO

SIR,—A controversy rages. One says this and the other that, but, as a man who has the honour to operate a receiver on which no expense has been spared to produce selectivity, purity, and, if required, volume, I should like to point out that I have had years of experience of broadcasts in all lands.

As I say, the receiver I operate is beyond the average person's pocket, but it gives me one thing over all others—truth in reproduction.

If people find that certain well-heard stations do not distort and emit a noise that irritates, then I must think their receivers must be very bad reproducers. My experience is that the stations of the B.B.C. are the purest in the world. Their programmes, for the number of hours working, are second to none. The next in purity to the B.B.C. are some German and Dutch stations.

As distortion irritates the ears, and as there are few days in the week that foreigners transmit really attractive programmes, my opinion is that foreign listening is not worth while.

Some of your readers want to be *compelled* to listen to some of these foreigners for hours as I have to do sometimes. Their views would be interesting.

This receiver under my control is the last word in design—and the B.B.C. stations are as pure at 1,000 miles distant as they are at 10. The trouble is that people have indifferent receivers and then proceed to blame the staffs of the B.B.C. and to pick holes in their work—little realising that those people's own receivers are untruthful and distort the purest of transmissions (especially at short distance). Let them first get receivers that are as truthful as possible—and then compare everything.

Yours faithfully,
L. J. PRYCE, Radio Operator.

January 30, 1931.

[This correspondence is now closed.—Ed.]

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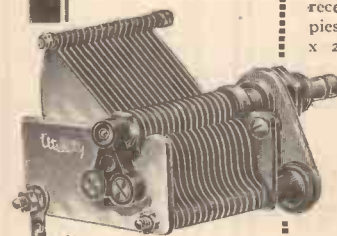
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Foreign Languages

Aids to Listening

GERMAN

DAVID COPPERFIELD

By Charles Dickens

We are giving a series of extracts from a German edition of "David Copperfield," published by the Insel Verlag, Leipzig, of which the third appears below. This extract is taken from Chapter 15.

"TROT," sagte meine Tante eines Abends, als Janet wie gewöhnlich das Puffbrett für sie und Mr. Dick hinsetzte, "wir dürfen deine Erziehung nicht vergessen."

Dies war meine einzige Sorge, und ich war sehr erfreut, dass sie darauf zu sprechen kam.

"Möchtest du nach Canterbury in die Schule gehen?" fragte meine Tante.

Ich sagte, dass mir das sehr lieb sein würde, da ich dann in ihrer Nähe bliebe.

"Gut," sagte meine Tante. "Möchtest du morgen fort?"

Da ich die rasche Entschlossenheit meiner Tante schon gewohnt war, so konnte mich dieser plötzliche Vorschlag nicht überraschen, und ich sagte: "Ja."

"Gut," sagte meine Tante wieder. "Janet, bestelle für morgen früh um zehn Uhr den grauen Pony und die Chaise, und packe heute abend Master Trotwoods Sachen ein."

Ich war sehr erfreut über diese Anordnungen; aber ich fühlte einen Stich im Herzen über meine Selbstsucht, als ich sah, welchen Eindruck sie auf Mr. Dick machten, der bei dem Gedanken an unsere Trennung so niedergeschlagen war und infolgedessen so schlecht spielte, dass meine Tante, nachdem sie ihm ein paarmal mit dem Würfelbecher warnend auf die Finger-

knöchel geklopft hatte, das Brett zumachte und erklärte, nicht weiterspielen zu wollen. Aber er wurde wieder heiter, als er von meiner Tante vernahm, dass ich Sonnabends manchmal herüberkommen und dass er mich manchmal Mittwochs besuchen sollte, und gelobte mir, zur Feier dieser Tage einen neuen Drachen, viel grösser als den jetzigen, anzufertigen. Am andern Morgen war er wieder niedergeschlagen und wollte sich damit trösten, dass er mir all sein Geld, Gold und Silber gab, wenn ihn meine Tante nicht abgehalten und das Geschenk auf fünf Schillinge, die später auf sein dringendes Anliegen auf zehn vermehrt wurden, beschränkt hätte. Wir schieden am Gartentor in der herzlichsten Weise, und Mr. Dick kehrte erst, als wir seinen Blicken entschwunden waren, in das Haus zurück.

Meine Tante, die sich aus der öffentlichen Meinung absolut nichts machte, leitete den grauen Pony in meisterlicher Weise durch Dover. Sie sass regungslos und gerade wie ein Staatskutscher, verfolgte jeden Schritt des Pferdes mit unverwandtem Blick und schien etwas Besonderes darin zu suchen, ihm nie den Willen zu lassen. Als wir auf die Landstrasse hinaus kamen, liess sie ihm etwas mehr freien Willen und sah auf mich, der ich in einem Berg von Kissen versunken neben ihr sass, herab, und fragte mich, ob ich glücklich sei.

"Sehr glücklich, danke, Tante," erwiderte ich.

Sie freute sich sehr darüber, und da sie beide Hände voll hatte, klopfte sie mir mit der Peitsche auf den Kopf.

"Ist eine grosse Schule, Tante?" fragte ich.

"Ich weiss es noch nicht," sagte meine Tante. "Wir gehen erst zu Mr. Wickfield."

"Ist das ein Schulvorsteher?" fragte ich.

"Nein, Trot," sagte meine Tante. "Er ist Sachwalter."

Endlich hielten wir vor einem sehr alten Hause, das in die Strasse hereinragte—vor einem Hause mit langen, schmalen, vergitterten Fenstern, die sich noch mehr vordrängten, und Balken mit ausgeschnitzten Köpfen an den Enden, die ebenfalls vorragten, so dass es mir vorkam, das ganze Haus beuge sich vor, um zu sehen, was unten auf dem schmalen Pflaster vorgehe. Es war in seiner Reinlichkeit vollkommen fleckenlos. Der altmodische, messingene Klopfer an der niedrigen, mit ausgeschnitzten Blumen = und Fruchtgirlanden gezierten Bogentür glänzte wie ein Stern; die zwei steinernen Stufen an der Tür waren so weiss, als wären sie mit schneeigem Linnen bedeckt, und alle Winkel und Ecken und Schnitzereien und Verzierungen und die wunderlichen kleinen Glasscheiben und die noch wunderlicheren alten Fenster waren trotz ihres hohen Alters so rein wie Schnee, der sich gerade auf die Erde senkt.

Als der Wagen vor der Tür hielt und ich das Haus musterte, sah ich in einem winzigen Fenster im Erdgeschoss (in einem kleinen runden Turm, der die eine Seite des Hauses bildete), ein leichenhaftes Gesicht erscheinen und rasch wieder verschwinden. Die niedrige, rundüberwölbte Tür ging dann auf, und das Gesicht kam heraus. Es war ganz so leichenhaft, wie es in dem Fenster aussah, obgleich es den leisen rötlichen Anflug hatte, der zuweilen dem Teint rothaariger Leute eigen ist. Das Gesicht gehörte einem rotköpfigen Menschen—einem Jüngling von fünfzehn Jahren, wie ich jetzt glaube, der aber viel älter aussah—dessen Haar ganz kurz war wie die kürzesten Stoppeln, der kaum Augenbrauen, keine Augenwimpern und rötlichbraune Augen hatte; letztere so unbeschützt und unbeschattet, dass ich mich wundere, wie er nur einschlafen konnte. Er war hochschulterig und hager, ganz in Schwarz gekleidet mit einem schmalen, weissen Halstuch, bis oben zugeknöpft, und

hatte eine lange, schmale, hagere Hand, die besonders meine Aufmerksamkeit auf sich zog, als er bei dem Pferde stand, sich mit der Hand das Kinn rieb und zu uns am Wagen hinauf sah.

"Ist Mr. Wickfield zu Hause, Uriah Heep?" fragte meine Tante.

"Mr. Wickfield ist zu Hause, Ma'am," sagte Uriah Heep; "wenn Sie gefälligst dort eintreten wollen"—und er wies mit seiner langen Hand nach dem Zimmer, das er meinte.

Wir stiegen aus, liessen den Wagen unter seiner Obhut und traten in ein langes, niedriges Zimmer, das auf die Strasse hinaussah und durch dessen Fenster ich Uriah Heep erblickte, wie er dem Pony in die Rüstern blies und sie dann mit der Hand zudeckte, als ob er einen Zauber über das Tier verhängte.

ITALIAN

La coltura dell' olivo in Italia

(Continuazione e fine)

A.—Ho letto il suo ultimo articolo, sulla coltura dell' olivo in Italia; e con mia grande soddisfazione posso dirle che l'ho capito da cima a fondo e che non ho dovuto ricorperne neppure una volta al dizionario.

B.—Davvero? Eppure non era punto facile. Me ne congratulo con lei. (*Notice this verb; it is reflective and takes the preposition "con." The reason is expressed by means of the preposition "di."* E.g., Mi congratulo con lei dei suoi progressi; me ne congratulo. "Di" is used likewise with other verbs expressing feelings and passions: piangere di, ridere di, dolersi di, meravigliarsi di, godere di, innamorarsi di, ecc.).

A.—Grazie. Ma se permette, ho un piccolo dubbio che vorrei che lei mi chiarisse . . .

B.—Dica pure! Si tratta (*is it a question of*) forse d'un dubbio di lingua?

A.—No; riguarda il soggetto stesso del suo articolo. Lei ha infatti scritto che la raccolta delle ulive dura tutti i mesi invernali. Ma cosa intende dire con questo? Bisogna prenderlo proprio alla lettera?

B.—Sì e no. La raccolta dura veramente dall'autunno alla primavera. Ma questo non significa che si raccolgono ulive tutti i santi giorni (*day in and day out*). Oh no! Generalmente si raccolgono ogni settimana, o giù di lì (*approximately*). Così si dà tempo a una buona quantità di ulive di maturarsi. Quando son mature, come lei già sa, esse cadono ai piedi degli alberi, e le donne non devono fare altro che raccattarle.

A.—Ed ora mi dica ancora una cosa. Io ricordo bene che la vite (*vine*) va soggetta a molte malattie, e che è spesso attaccata da parassiti. Vi sono anche dei nemici dell' ulivo?

B.—Eh, altro che! Sfortunatamente anche in questo caso si può ripetere il proverbio "non c'è rosa senza spine!" Parecchi sono i pericoli che insidiano la coltivazione dell' ulivo. Il peggiore è forse quello della mosca olivina (*olive fly*). La quale (*notice the use of "la quale" to start a fresh sentence; the same for "il quale, i quali, ecc."*) è un tantino più piccola della mosca comune, e ha la pessima abitudine di deporre le uova nel frutto dell' ulivo. Lei ne immaginerà facilmente la conseguenza: le uova schiudono, e le larve, appena nate, si danno all'attacco della povera uliva, e in breve tempo se la mangiano tutta. Ma l' uliva non è eterna, e un bel giorno, finito l'ultimo boccone, le poverette fanno un bel capitolombolo e si trovano a terra.

A.—E muoiono?

B.—Ma che! Si trasformano in crisalidi, e le crisalidi dopo poco in mosche. Una vita avventurosa, come vede; e non priva d'interesse. Ma i proprietari degli uliveti sarebbero felicissimi se la Natura non avesse perduto chissà quanto tempo per fare un animaletto così

(Continued on page 195, column 3)

LISTEN AND LEARN!!

Do you realise that the torrent of foreign words emerging from your loud speaker can be turned to good account? Start a course of German, or any language, at the nearest Berlitz School, and your Radio will be of considerable assistance in mastering the language. It will soon become quite fascinating to follow not only the Foreign Announcer, but the entire programme he controls.

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TECHNICAL SECTION

Power from the Mains

THIS mains business has been catching my eye lately. Not only for high-tension supply, but the obtaining of filament heating current also from that source. The release from charging worries and costly replacements is sufficient motive in itself to make the drastic change.

My decision came about in this way. I ran across some friends the other day, when radio talk was in the air. They were talking of mains sets and the desirability, wherever and whenever possible, of changing over from battery operation to the mains. Nobody seemed to be able to agree whether any final advantage was to be gained, or whether the disadvantages outweighed the advantages. I was obliged to admit that I knew nothing of mains sets and, therefore, was not justified in giving my opinion.

So I was forced to listen and, in listening, I gathered that the chief grumbles connected with the use of the indirectly-heated cathode A.C. valve were definitely an increase in hum—small though it may be in many instances—an inclination to motor-boating, a little fierceness of reaction, and a far less quiet background. It was left to common sense—so they put it—to enumerate the good points.

Now all these grumbles may be genuine, but—and I told them so—I considered they were easily overcome with, perhaps, the exception of the last. Background noise, I have discovered, will generally be found to have its origin in the detector stage; the more so has this been noticeable as the efficiency of the detector valve in use is augmented. The higher the mutual conductance of this valve the more hiss and "mush" there seems to be found in the background of the body of the sound coming from the speaker.

I am not, of course, talking of atmospheric and noises caused by local electrical disturbances which will always be heard in spite of elaborate precautions, but the effect I have in mind is that ability to develop rustlings and hissings inherent in all detectors to some degree. Much more evident will this background hiss be, then, when an indirectly-heated cathode valve is used, owing to the far greater efficiency (input-output percentage) of this type of valve. Filament consumption, within sensible bounds, is, of course, immaterial, since current is drawn from the mains; and an immense source of emission, therefore, is available.

But here another consideration enters into the problem—the elimination of hum. Try working an ordinary battery-type valve in the detector stage of an all-mains set. You notice, do you not, the ear-piercing grinding hum? This is only because the filament does not possess sufficient heat-retaining properties to overcome the hum-producing propensities of the alternating current applied to the filament terminals.

The problem had to be tackled, and the indirectly-heated A.C. mains valve was produced. The source of supply of emission—the cathode—in one of these valves, is constructed in such a way that it is entirely separate from the heater portion, heated by the alternating current. The heater takes the form of a thick filament—in most of these valves the consumption is 1 ampere at 4 volts—and around this filament, but insulated from it, the cathode, a small cylinder coated with chemical elements having great properties of emission—in general the rare barium or strontium—is placed.

The heat generated by the heater through the

application of the A.C. is transferred to the cathode which, in its turn, becomes hot and supplies the necessary electron emission. The cathode is slow to obtain its heat and correspondingly slow to discard it and thus is unaffected by the ever-changing polarity of an alternating current.

I set to, with great hopes, making my conversion. I found everything straightforward and when at last I switched on, the set operated immediately—immediately, I mean, that any sound came from the loud speaker. It is a strange feeling, at first, to switch on and then have to wait 20 to 30 seconds for the signals to materialise—the time taken for the effective heat to be developed in the indirectly-heated cathode.

My first impression was that of immense amplification—which I expected—and an increase of hum, which I did not expect, since the makers of these valves claim that no added hum will result. I made for the source of this

power valve in the output stage of an all-from-the-mains receiver can be used without any increase of hum, but there is a substantial decrease in amplification. The results from an indirectly-heated super-power valve in the output stage can only be described as stupendous.

I do not know, however, whether the use of a battery type valve in the first low-frequency stage is practised and accepted, but I used one with complete success, but again with a substantial decrease in amplification when compared with an A.C. valve. For the transformation, therefore, to "all from the mains," if the only bugbear to be avoided is hum, indirectly-heated valves are not essential for the low-frequency stages, although, for the amplification obtained, they are worth every penny of their cost.

Motor-boating, and fierceness of reaction—those two other grumbles—I have always found rather dependent one upon the other. Now, I found an inclination to motor-boating, and a sharply-defined fierceness of the reaction control. Fierce reaction can be due to several causes; too large a controlling condenser, too



"CANNED" PROGRAMMES
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Price Studios, New York.

noise immediately, investigated it and succeeded finally in removing it.

The transformer I use for supplying the 4 volts has, on the primary winding, several tappings for matching varying mains voltages according to the supply on which it will be used: 0-200, 0-230, 0-250 volts. My mains voltage is 200, and the transformer was, at the outset, wired up accordingly. I then proceeded to attach the mains to the tapping marked 0-230 volts, resulting in a current something less than 4 volts being applied, *via* the secondary winding, to the heaters of the A.C. valves. Here seemed to be the secret of success. The hum had disappeared—the first grumble disproved.

I then tried ordinary battery-type valves in all stages other than the detector. It is, of course, well-known that an ordinary super-

large a reaction winding coupled to the tuning coil, or too high a voltage on the plate of the detector valve.

I reduced the voltage on the detector, the fierceness resolved itself into smoothness, and the inclination to motor-boating disappeared. I found there was no need to use resistances and by-pass condensers in the H.T. leads as is the recognised method of curing motor-boating, but I do not deny that my own trouble was not, perhaps, typical of the usual type of motor-boating.

That final grumble—background hiss—I have dealt with and given reasons for. So these are the possible, but certainly not necessarily probable, troubles to be encountered in a home-converted all-mains set. I leave it, not solely to the reader's common sense, but to his own experiments to count out the advantages. J. S.

Traders' Bulletin

No. 25—North Regional Station—Public Supply Mains—Visits to Brookmans Park

DURING the past month there has been satisfactory progress in the installation of the transmitters, the equipment in the control rooms, etc., at the North Regional Station. It is probable, before the next Bulletin is published, that the North Regional transmitter, on 479 metres, will be heard testing outside programme hours on an open aerial, but we would take this opportunity again to warn Traders not to attach any importance to the results of these very early tests, as the power or modulation may be widely different from that which will obtain under service conditions. When it is possible to radiate tests under full service conditions, *i.e.*, when we are satisfied by preliminary testing of the apparatus that the performance is up to standard; announcements will be made and regular test transmissions under service conditions will commence.

Statements have been made that there is a fine technical hitch in the design or equipment of the station. This is quite incorrect, as there have been no delays other than those brought about by weather conditions, and other causes entirely outside the control of the Corporation.

Fluctuations in voltage and frequency of Public Supply Mains

From time to time the B.B.C. is informed by Traders, Service Agents, or listeners, of difficulties caused by voltage fluctuations of supply mains when all-mains receivers or radio gramophones are being installed or maintained. Although it is not thought that this has reached anything approaching serious proportions, possibly it will be of interest to include some remarks in this Bulletin concerning the regulations on the subject. The remarks which follow are extracted from the Regulations made under the Electricity Supply Acts of 1882 to 1919 (E.L.C. 13 and E.L.C. 38). It is pointed out that these regulations apply only to authorised public supply undertakings and not to the small private concerns which still exist in certain country districts. By the latter we mean the small undertaking which may be owned by a landlord, who, by agreement, has undertaken to supply a small town or village, probably in addition to the power generated for the requirements in his own house.

In so far as recognised public supply undertakings are concerned, energy is usually delivered to domestic consumers' terminals at a pressure not exceeding 500 volts, so that there is no need for a step-down transformer to be employed. Supplies at low or "domestic" pressures must be maintained by the supply undertaking within plus or minus 4 per cent. of the stated voltage. This variation allowance of 4 per cent. is generally applicable throughout the country. It is pointed out, of course, that this limitation refers only to the voltage fluctuation at the consumers' input terminals, and the supply undertaking is not liable for any voltage drop due to an inadequate current-carrying capacity of the consumer's house mains.

We stress this point, as the increase in the use of electricity for domestic purposes may in certain circumstances result in house mains being expected to carry a far heavier load than that for which they were originally designed. If, therefore, a heavy voltage fluctuation is experienced at the point from which the receiver draws its energy, it will be advisable first to check whether there is a severe voltage drop on the house wiring before making any representations to the supply undertaking. In a few circumstances, particularly where country houses are concerned, the consumer may have

recently changed over from a private generating set to a public supply, and the site of his old generating station may be some distance from the house. If the public supply is delivered to the bus-bars at the old generating station, a voltage drop may easily occur on the connecting lines between the generating station and the house, for which the supply undertaking is probably not liable.

In most cases a fuse box is installed very close to the meter or point at which the supply is delivered to the house, and this may be found a convenient place for experienced persons to carry out voltage measurements. The penalty incurred by a supply authority which exceeds the 4 per cent. voltage fluctuation, as laid down by the regulations made under the Electricity Acts, is very severe, namely, £5 for each default made and an additional penalty of £5 per day for each ensuing day on which the fluctuation exceeds the prescribed limits.

It is only in a few cases, where large consumers are concerned (such as local authorities, factories, mines, or transport concerns, etc.), that energy may be taken at high tension, *i.e.*, over 3,000 volts. Where high-tension supplies are concerned, the supplier is required to keep his pressure not less than the minimum declared to the consumer (whether a local supply authority or a factory, etc., as above), and not exceeding the minimum by more than 12½ per cent. In the case of a local supply authority taking such a supply in bulk, the onus of maintaining the pressure of the domestic supply (given by that authority) within the 4 per cent. limits rests with such authority.

In so far as wireless sets are concerned, fluctuations in frequency are unlikely to present serious difficulties, but it may be of interest to state that the law (*i.e.*, the Electricity Regulations) allows a variation of only 2½ per cent. plus or minus the stated frequency.

The above statements apply, of course, only to existing regulations, and it should be borne in mind that these regulations may be modified in the future if it is thought desirable in the interests of the various parties concerned.

Traders' Visits to Brookmans Park

Traders are doubtless aware that members of the public have been shown over the Brookmans Park Station since the transmitters came into full operation on March 9 last. These visitors have been shown round the station in parties of about 20 to 30 each, on Saturday afternoons between the hours of 3.0 and 5.0 p.m.

It is thought that there are many Traders and members of their staffs who would prefer to see the station in company with their colleagues rather than with a party of, possibly, non-technical listeners. Also, it is realised that Saturday is often the Wireless Retailers' busiest day of the week, and in many cases it would be impossible for members of their staff to be absent at that time.

It is proposed, therefore, to allot two special dates, arranged to coincide with shops' early closing days, on which parties of Traders will be met at Brookmans Park by an engineer, and conducted over the station. We think such an arrangement would be of assistance to the Trade generally, by enabling them and their staffs to become more familiar with the technical conditions under which the alternative programme service is radiated, and also in helping them to answer some of the many questions which Traders are often asked by their clients.

The two dates which we are earmarking for

Traders to visit Brookmans Park are: March 11 and 12. The actual arrangement of the parties will depend to some extent upon the number of applications received, and the times at which the visitors wish to arrive. It is proposed, however, to allow about an hour and a half for each party, and, if possible, parties will be arranged for 11 a.m., 2.30 p.m., and 4.30 p.m. on each of the two dates.

Will Traders who wish to visit the Brookmans Park Station, on either of the above dates, or for members of their staff to do so, please write to the Chief Engineer, the B.B.C., Savoy Hill, W.C.2, stating which date and time would be most convenient to them, and a permit will be sent. Applications for permits must be on trade paper, or accompanied by a trade card, and if the application is for more than one person, the other persons included in the party should be actually engaged in the wireless trade, such as employees. It cannot be guaranteed that permits will be sent for the time stated, but every effort will be made to do so. Should the time asked for be already fully booked up, an alternative will be offered, by letter.

We shall be grateful if Traders wishing to avail themselves of this offer will write as soon as possible; the applications being dealt with in the order in which they are received. In the unlikely event of it being impracticable to fit the number of applications into these two days other arrangements will be considered.

The Brookmans Park Station, as is already well known, is about seventeen miles north of London on the old Great North Road, about midway between Potters Bar and Hatfield. The nearest railway station is Brookmans Park (about two miles), which is approximately forty minutes' run from King's Cross. There is also a half-hourly service of motor coaches from London to Welwyn, which pass the gates of the transmitting station. The journey from Oxford Circus to the station takes approximately an hour.

Correspondence

To the Editor of WORLD-RADIO

SIR,—Herewith a few reports for your Short-Wave Column, which I much appreciate, and I may say that I listen to these stations for a reason which none of your correspondents in the "distant listening" controversy have put forward as a good reason for the habit, namely, because I have "been over."

Bound Brook (49.18). Heard at Edinburgh nightly. Strength usually R5-6, but occasionally less, with rapid fading. 'Phones, 0-v-1 receiver.

Pittsburgh (48.86). Heard Jan. 14, 21, and 24. Buenos Aires (28.98). Heard nightly after twelve. Strength usually R3-4, but on Jan. 22, R7, all S.W. stations being particularly clear late that night. Announces after every item—"LSX Gran Radio Buenos Aires."

Schenectady (31.48). Heard at excellent strength (R7-8) Jan. 21, 22 and 25. On the latter date as early as 9.20 p.m. Certainly best American station heard here during past two years.

Chicago (49.83). Heard on Jan. 22, 23 and 24. R3 on 'phones. Not loud enough for listening.

Richmond Hill (49.02). Heard Jan. 24. (only R3).

Philadelphia (49.5). Heard Jan. 22. Strength R3 on 'phones; less fading than Chicago.

Zeesen (31.38). Heard on Sundays during forenoon and afternoon.

May I add that after midnight on Jan. 14 until 12.15 a most phenomenal condition existed on the 300-500 metre waveband, and a number of American transmissions came over at a strength I have never experienced before, or since. There was no fading during the fifteen minutes referred to, and New York (WEAF), on 454 metres, and Schenectady (WGY), on 380 metres, were identified by announcements.

Yours faithfully,

Edinburgh.

A. S.

Mystery of the Ether

By RALPH STRANGER

Author of "Mystery of Electricity," "Mystery of Magnetism," etc.

(Continued from page 115, January 23, 1931)

NOW that we have made our acquaintance with the hypothesis of Professor W. M. Thornton, who regards protons and electrons as vortici in the ether, and that of Sir Oliver Lodge, who is inclined to think that a proton is a solid dense sphere of ether while an electron is merely a bubble, we are ready to consider other modern views on the architecture of the two mysterious particles of electricity, and to be introduced to the so-called *wavicle*. The latter is a coined word derived from the two words: wave and particle. As the name implies, modern science found evidence that a material particle also possesses some wave properties.

Before we go further, however, let us become familiar with the quantum theory which, at present, is being used side by side with the wave theory of matter, the two being far from reconciled at the moment. As a matter of fact, the classical laws of physics and the modern theories are so much in the melting pot at the moment, that, as Professor A. S. Eddington aptly puts it, the modern physicist has to use classical laws on Mondays, Wednesdays and Fridays, and modern theories during the remaining days of the week.

Up to the year 1900 it was fashionable to think that radiation represents a continuous process, *i.e.*, energy is being continuously radiated by the radiator. At the beginning of this century however, Plank established the fact that radiation is far from being continuous, and that it occurs as a series of impulses. The whole tendency of modern physics is to do away with continuity. The only apparent continuum we know of is the ether, which fills the whole of the Universe. Matter is not continuous. Hubble estimated that the mean density of matter in space is about 1.5×10.31 that of water. This is a very small figure. Considering that the radius of the globe of ether is given as 84,000,000,000 light years, and the circumference as 500,000,000,000 light years (Einstein), there is precious little matter in the Universe. Whichever way you look upon the constitution of protons and electrons, they are localised particles in the ether continuum.

Plank introduced the same discontinuity into the radiation of energy. According to him, energy is being radiated in definite quantities, or units, and he called such a unit of radiated energy a *quantum*. A quantum is a definite amount of energy which exists as a whole just in the same way as an electron exists as a whole. Just as we cannot have half an electron, or a quarter of a proton, we cannot have a fraction of a quantum. It is either a whole quantum or nothing, though, naturally, we can have a number of whole quanta. Thus any body that radiates energy or absorbs energy has to deal with whole quanta, *i.e.*, one quantum, or a number of quanta, but not a fraction of one.

Thus we can imagine a radiator emitting energy just like a machine gun firing a stream of bullets, one bullet after another leaving the muzzle of the gun. The machine gun fires only whole bullets, it cannot fire a half or a quarter of a bullet. Since radiated energy is being transmitted in the form of electro-magnetic waves, it would appear that we have to think of each quantum as a parcel of waves, one parcel after another being emitted by the radiator.

In the case of matter the proton and the electron, as far as we know, represent the smallest indivisible particles of matter. Both of them are particles of electricity, each representing

an identical quantity of electricity, but of a different kind. *Not every quantum represents the same amount of energy.* There is a different quantum for every wavelength of the radiated wave. The amount of energy in a quantum is proportional to the frequency of the radiated wave. The higher the frequency (*i.e.*, the smaller the wavelength) the larger is the amount of energy contained in each quantum.

Now, we come to a very remarkable thing. When certain radiations reach the polished surface of a metal, they cause electrons to be ejected from the atoms of that surface. These ejected electrons are referred to as *secondary electrons*, and the effect is known as the *photo-electric effect*. But not every kind of radiation will produce the same effect. Thus, for instance, red light will fail to eject any electrons. Violet light will cause a sluggish emission of secondary electrons. Ultra-violet light will give much more active results and cause the secondary electrons to leave their atoms with considerable



The short-wave transmitter VK3ME at Braybrook, Australia

speed, while X-rays will send out high-velocity electrons. You will notice that X-rays have the smallest wavelength, and therefore the highest frequency amongst the above-mentioned radiations. The quanta due to X-rays are thus more powerful, they possess more energy than the quanta due to the other radiations.

The number of secondary electrons, leaving the surface in question, depends on the intensity of light, while the speed communicated to them depends on the frequency of radiation. The reason for this is that the absorption of one quantum breaks up one atom, and one quantum will eject only one secondary electron. A greater intensity of light means that more quanta are reaching the surface of metal simultaneously, and therefore a larger number of electrons is being ejected simultaneously, while a larger quantum will communicate greater speed to the ejected electron.

There is a certain minimum energy required to eject an electron from an atom. The red light quantum possesses less than the necessary minimum amount of energy, and, therefore, fails to eject an electron. In the case of X-rays the effect of quanta on electrons is very illuminating. As you probably know, X-rays are

(Continued in column 3, page 192)

Below 100 Metres

By "VERNIER"

IT will come as welcome news to British short-wave listeners that VK3ME, the Australian transmitter, which some time ago relayed the programmes of 3LO, Melbourne, is once again transmitting on regular schedule. Transmissions are carried out each Saturday from 10.0 to 11.30 a.m. G.M.T., on 31.56 metres, and reception reports will be welcomed both by the Editor of *World-Radio* and the Chief Engineer, Amalgamated Wireless (Australasia), Ltd., at 47, York Street, Sydney.

The transmitter of VK3ME is situated at Braybrook some few miles out of Melbourne, on the main road to Ballan, where the famous beam station operates. In the same building is the transmitter of 3LO, which is leased to the Australian Post Office to broadcast the programmes of the National Broadcasting Service. It should be understood, however, that there is now no connexion between 3LO and short-wave station VK3ME, which, I understand, will in future transmit the programmes of "B" class stations, *i.e.*, those that broadcast sponsored programmes. There are two "B" class stations in Melbourne, 3DB and 3UZ. Both VK3ME and VK2ME, which transmit with a power of 5 kW. in the aerial, also relay at

intervals the programmes of "B" class stations in the Eastern States to those in the West.

There appears in the past to have been some confusion with regard to the call signs VK2ME and VK3ME. The former is the experimental call sign for all transmissions emanating from Radio Centre, Pennant Hills, N.S.W.; and the latter was used for similar transmissions from Braybrook, Victoria. There are eleven transmitters at Pennant Hills and three at Braybrook.

The following schedule of transmissions is the latest from PCJ. Wednesday, 6 to 8 p.m. G.M.T. Thursday, 6 to 8 p.m., and 11 p.m. to 3 a.m. (Fri.). Friday, 6 to 8 p.m., and 12 midnight to 6 a.m. (Sat.). I understand that extensive alterations have recently been carried out to the aerial system at Eindhoven.

Reception conditions during the past fortnight have been somewhat variable, and static on the upper bands has generally been prevalent. W3XAL, as usual, has been good on 49.18 metres, and W8XK on 48.86 metres has not been far behind him in volume. Reception on the 49 metre band was exceptionally good on the evening of Saturday, January 24. The nightly Amos 'n Andy broadcast over the "blue" network of the National Broadcasting (Continued at foot of column 3, page 192)

SHORT-WAVE STATIONS

M.	Kc/s	Station
70.1	4280	Khabarovsk (U.S.S.R.). 9 a.m. to 12 noon.
67.65	4424	Döberitz (Germany), AFK, 5 kW.
61	4918	Radio-LL (France), 0.5 kW.
58	5172	Prague. TUES. and FRI., 7.30-9.30 p.m.
50	6000	Barcelona Radio Club EAJ25. SAT. 8-9 p.m.
50	6000	Bucharest (Romania) 0.3 kW.
50	6000	Nairobi (Kenya) 7LO. Daily 4-7.30 p.m.
49.83	6020	Chicago (Ill.) W9XF. 5 kW. Relays WENR, SUN. 5-7 a.m., 1-5.30 p.m., 8.30-11 p.m. and 1-6 a.m. (Mon.); Weekdays, 3.15-4.45 p.m., 8.30 p.m.-12 m't and (ex. SAT.) 1.30-6 a.m.
49.67	6040	New York (W2XAL). 0.25 kW. TUES., 12 m't.-5 a.m. WED., 12 m't.-2 a.m. FRI., 12 m't.-4 a.m. SAT., 12 m't.-3 a.m.
49.5	6060	Cincinnati W8XAL. Relays WLW.
49.5	6060	Philadelphia (Pa.) W3XAU. 0.5 kW. Relays WCAU. Daily 2-9 p.m. THURS. and FRI., 2 p.m.-6 a.m.
49.5	6060	Winnipeg (Canada) VE9CL. 2 kW. Daily (except Sun.) from 11.30 p.m.-1.30 a.m.
49.4	6072	Vienna, 0.4 kW. TUES., 10 a.m.-12 noon. THURS., 2-3 p.m. SAT., 10 p.m.-12 m't.
49.34	6030	Chicago (Ill.) W9XAA. 0.5 kW. Relays WCFB. Daily 2-5 a.m.
49.22	6095	Toronto (Canada) VE9GW. 0.015 kW. Daily, 11.45 a.m.-5 p.m., 9 p.m.-5 a.m.
49.18	6105	Bound Brook (N.J.) W3XAL. 12 kW. Weekdays, 10-11 p.m., and 4-6 a.m.
49.02	6120	Richmond Hill (N.Y.) W2XE, 0.5 kW. Relays WABC. Daily, 1 p.m.-5 a.m. next day.
49	6122	Saigon (French Indo-China).
48.85	6140	Pittsburg East (W8XK). Relays KDKA. WED. and SAT., 10 p.m.-5 a.m.
48.84	6147	Manila (Philippine Islands) KZRM. Daily 8 a.m.-3 p.m. (except MONDAY).
48.62	6170	Tegucigalpa (Honduras) HRB. 2.5 kW. Daily (except MON.), 1.30-5 a.m.
48.35	6205	Bogota (Colombia) HKC. Daily, 3 p.m.
48	6250	Casablanca (N. Africa) CN5MC. Relays Rabat. MON. 8-10 p.m. TUES. 12 noon-1 p.m. and 8-10 p.m.
47	6382	Funchal (Madeira) CT3AG. THURS. and SAT., 10 p.m.-1 a.m.
46.6	6438	Moscow, TUE., THUR. & SAT., 12 n'n-1 p.m.
45	6667	Constantine (Algeria) 8 KR, 0.2 kW. MON. and FRI., 10 p.m.
44	6818	San Lazaro (Mexico) XDA, 3 kW. 1 a.m.
43.86	6840	Georgetown (British Guiana) VRY 0.12 kW. SUN. 10.45 p.m.-2.15 a.m. THURS. 12.15 a.m.-2.15 a.m. Occasional evng. transmissions.
43	6976	Madrid (EARL). DUES. & SAT., 10.30 p.m.
42.9	6991	Lisbon CT1AA. 0.7 kW. FRI., 10 p.m.
41.7	7195	Singapore VS1AB. MON., WED., and FRI., 2.30-4 p.m.
41.6	7211	Tenerife Radio Club (Canary Islands).
41	7316	Radio Vitis. Testing.
40.2	7433	Lyons YR. Weekdays, 4.30-5.30 p.m.
39.7	7553	Bogota (Colombia) HKF.
37.76	7968	Bangkok (Siam) HSP. 20 kW. Irregular.
36.92	8125	Bandoeng (Java) PLW.
34.68	8650	Long Island W2XV. FRI. 11 p.m.-1.30 a.m.
32.5	9232	(F.L.). Time Sig. 8.56 a.m. and p.m.
32.26	9300	Rabat (Radio Maroc) 6 kW. SUN. 7-9 p.m.
32	9375	Beine (Switzerland) EH90C.
32	9375	San Lazaro (Mexico) XDA 20 kW. 9 p.m.
31.56	9500	Melbourne (Australia) 5 kW. SAT. only 10-11.30 a.m.
31.51	9520	Lyngby (Denmark) OXY. 0.5 kW. Relays Copenhagen. DUES. 7 p.m. to close down.
31.48	9530	Schenectady N.Y. (W2XAF). 10 kW. (Aer.) Relays WGY. Daily from 10.30 p.m.-4 a.m.
31.4	9554	Manila KATXR. Relays KZRM.
31.38	9560	Zeesen (Germany). 8 kW. Relays various stations, generally 1 p.m.-12.30 a.m.
31.35	9569	Springfield (Mass.) W1XAZ. 8-10 p.m.
31.28	9590	Eindhoven (Holland) PCJ, 25 kW. WED., 6-8 p.m. THURS., 6-8 p.m. and 11-3 a.m. (FRI.). FRI., 6-8 p.m. and 12 m't. to 6 a.m. (SAT.).
31.23	9590	Philadelphia (Pa.) W3XAU. 0.5 kW. Daily (except THURS. and FRI.), 9 p.m.-6 a.m.
30.86	9715	Heredia (Costa Rica) NRH, 7.5 watts. Daily 10-11 p.m. and 2-3 a.m.
30.75	9758	Agen. TUES. and FRI., 9-10.15 p.m.
30.5	9836	Poznan (Poland), 0.25 kW. TUES., 6.45-9.45 p.m. THURS., 6.30 p.m.-1 a.m.
30	10,000	Belgrade. MON. only, 8-9 p.m.
29.5	10,167	Bangkok (Siam) HSG. 1 kW. MON., 1-4 a.m.
29	10,345	Saigon (French Indo-China). Irregular.
28.98	10,350	Buenos Aires. LSX. 20 kW. Weekdays 12 m't.-2 a.m.
28.2	10,365	Bandoeng (Java) PLR.
26.1	11,495	Manila KATXR. Relays KZRM.
25.53	11,751	Chelmsford (G5SW), 10 kW. (Aer.) Relays 5XX daily (except SAT. and SUN.), 12.30-1.30 p.m., and 7 p.m.-12 m't.
25.42	11,800	Vienna, 0.24 kW. TUES., 2-4 p.m.; WED., 10 p.m.-12 m't.; THURS., 10 a.m.-12 noon.
25.4	11,810	Rome (Italy) 3RO. 9 kW. (Aer.).
25.34	11,840	Chicago (Ill.) W9XAA. Relays WCFB.
25.27	11,870	Calcutta (India) VUC. 0.5 kW. Weekdays, 2.45-3.45 a.m. and 1-2 p.m.
25.25	11,880	Pittsburg East (W8XK). 5 p.m.-3 a.m.
24.5	12,240	Manila (Philippine Islands) KATXR. Relays KZRM. Weekdays, 10 a.m.-2 p.m.
23.28	12,887	Rabat (Radio Maroc) 6 kW. SUN., 11.30 a.m.
21.5	13,950	Bucharest, 0.3 kW. WED. and SAT., 7.10 p.m.
21.3	14,080	San Lazaro (Mexico). Daily at 4 p.m. News.
19.72	15,210	Pittsburg East (W8XK). Relays KDKA, WED. and SAT., 12 noon-4 p.m.
19.56	15,340	Schenectady (W2XAD). 20 kW. Relays WGY. Daily (except SAT.), 6-8 p.m.
16.9	17,750	Bangkok HSJ, 20 kW. SUN. Noon-2.30; 6-8 p.m. TUES. 1-3 p.m. and 6-8 p.m.
16.8	17,850	Bandoeng (Java) PLF, 30 kW.
16.52	18,160	Bandoeng (Java) PMC.
16.3	18,404	Kootwyk (Holland), PCK. From 7 a.m.
16	18,750	San Lazaro (Mexico) XDA, 20 kW. 4 p.m.
15.93	18,830	Bandoeng (PLE). TUES., 1.40-3.40 p.m.
15.5	19,351	Nancy (France). 9.10 p.m.

Short-Wave Notes

THE magnetic storm of Thursday evening (Jan. 29) seriously affected all trans-Atlantic communication. W2XAD (19.56), for instance, was not heard, for the first time for several months. In the afternoon of the same day, however, Zeesen (31.38), and Moscow (46.6) were well received. At the time of going to press, few reports have come in regarding reception on Jan. 29, probably because of the poor conditions referred to.

On the afternoon of Tuesday (Jan. 27), an American short-wave station, W2XAW, was heard transmitting unmistakable television signals on a wavelength of 17.34 metres (17,300 kc/s). The transmission was announced as "wave propagation tests," and is understood to have been made in connection with measurements of the Heaviside Layer. Some fading, to extinction, was noted; otherwise signals were quite good.

The new short-wave transmitter at the Vatican was testing on Friday night (Jan. 30) from midnight until about 1 a.m., the call-letters and the wavelength employed being announced in English, as HVJ, and 50.26 metres, respectively. Reception was at excellent loud speaker strength, and the speaker called New York, London, Poldhu and Chelmsford. The apparatus comprises a modified Marconi-Franklin beam transmitter, with a normal output of 10 kW. (aerial) fed to two Franklin uniform aerials. Tests have also been made on a 19.84 metre wavelength.

The Dutch station on 50.1 metres, mentioned in last week's notes, was again heard relaying Hilversum (organ music in the Huizen programme) on Friday (Jan. 30), closing down at 3.30 p.m.

Readers' Reports

Philadelphia (49.5). Good head-phone reception at Uxbridge, 10.55 to 11.15 p.m., Jan. 22. Steady, but noisy background. Programme—old dance tunes, variety and news (0-v-2 set).

Bound Brook (49.18). Fair L.S. reception at Uxbridge, 10.30 to 10.50 p.m., Jan. 21; also, at similar times on Jan. 22, 23 and 24 (0-v-2 set). Good L.S. reception at Kempston, Bedford (0-v-2 set) and clear 'phone reception at Mill Hill, London (0-v-1 set)—both on Jan. 24. Good L.S. volume at Hastings, Jan. 22 and 23. Strong, clear and free from fading (0-v-2 set).

Saigon (49). Reception, on Sunday, Jan. 25, reported from Thornton Heath (good 'phone reception, 0-v-1 set) and from Erdington (weak, but clear 'phone strength on a one-valve set). Orchestral items, call "Radio Saigon" (pronounced Sygon), and gong interval signals as usual. Also heard at Scarborough, apparently testing with Paris at 2 p.m., Jan. 24 on a wavelength of 24.75 metres, approx. Good L.S. strength on SG-v-2 receiver.

Pittsburg East (48.86). Good L.S. reception at Kempston, 11.50 p.m., Jan. 24 (0-v-2 set); also at Uxbridge, 11.0 to 11.20 p.m., Jan. 21 and 24 (0-v-2 set).

Lisbon (42.9). Three readers report reception on Friday, Jan. 23, between 10 and 11.15 p.m. Programme of gramophone records, and requests for reports heard in each case. Good L.S. volume at Kempston, Uxbridge, and at Hastings. The receiver in each case was of the 0-v-2 type.

Buenos Aires (28.98). The same three readers report good L.S. reception, from midnight, Jan. 24—no fading or static interference.

MYSTERY OF ETHER

(Continued from page 191)

produced by allowing a beam of electrons to pass at high velocity in an exhausted glass tube, and to fall upon a solid metal obstacle or "target." The sudden stoppage of these electrons by the atoms of the target causes the radiations known as X-rays.

An analysis of X-rays shows that they consist of waves of a number of frequencies, with a certain maximum frequency which depends upon the potential applied to the discharge tube. With the increase of this potential the maximum frequency is increased. Thus the higher the potential applied to the discharge tube, the larger is the quantum of the X-ray.

As has already been mentioned, X-rays falling upon a metal body will cause emission of secondary electrons from that body. The velocity communicated to the secondary electrons was found to be almost exactly equal to the maximum speed of electrons which produced the X-rays. This means that an electron ejected from an atom by an X-ray quantum will possess the same amount of kinetic energy as the electron which was stopped and produced the X-ray radiation. Let V be the potential applied to the discharge tube. If e is the electric charge of an electron, then the maximum energy (E) of an electron in the cathode beam is $E = Ve$.

Now, let us call the maximum frequency of the emitted radiation f . It was found experimentally that f is directly proportional to Ve , so that $E = Ve = hf$, where h is a constant, known as Planck's constant, the numerical value of which is 6.555×10^{-27} ergs-seconds. In the case of the secondary electron emission, since f is the frequency of the incident radiation, the maximum kinetic energy of the secondary electron was found to be again hf , where h is the same constant, so that once more $E = hf$.

What it all means is that an electron travelling at a certain velocity and impinging upon a solid target, will cause a disturbance in the ether. This disturbance reaching another body will knock out of it another electron possessing the same velocity as the disturbing electron. Sir William Bragg quotes a mechanical analogy to emphasise this extraordinary fact. He asks one to imagine that a wooden plank, dropped from a height of, say, 30 feet in New York harbour, would cause a wave to travel across the Atlantic, which, on reaching the Liverpool landing stage, would suddenly cause a wooden plank, peacefully floating in water, to rise some 30 feet into the air! The point to note is that a parcel of electro-magnetic waves, in other words a quantum, produced by a sudden stoppage of a material particle, will cause another material particle to acquire the energy liberated by the first particle, as soon as it is absorbed.

(To be continued)

BELOW 100 METRES

(Continued from page 191)

Company could be heard on the loudspeaker at good volume both from W8XK, and also from a transmitter on a slightly lower frequency, which I assumed to be W8XAL, Cincinnati, Ohio. W2XE and W9XF also gave very strong signals.

W2XAD, during the period under review, has, as usual, put over a good signal during the earlier part of his transmissions. With the advent of the summer months I hope to see conditions greatly improve for the reception of the Schenectady transmitter, if he keeps to his present schedule. Signals were particularly good on the evening of January 25, but noticeably weaker on the evening of Sunday, February 1.

Of the European transmitters, Zeesen and Rome have given good volume during their afternoon transmissions, and Lisbon can be relied upon to give a strong signal, but with rather poor quality.

Programmes for Tuesday—(Cont.)

Transmits at intervals from 5.15 a.m.
 6.10 p.m.—Time Signal.
 6.15 p.m. (from Freiburg).—Talk by Professor H. Zöllner: Personal Reminiscences of Liszt and Richard Wagner.
 6.45—9.15 p.m.—Programme from Frankfurt.
 9.15 p.m.—Programme Announcements, News and Weather.
 9.30 p.m.—Gramophone Dance Music. Relays from the Stuttgart Six Days' Racing in the intervals.
 11.0 p.m. (approx.).—Close Down.

MUNICH (Germany)
 563 kc/s (533 m.); 1.7 kW. Relayed by Augsburg, 536 kc/s (560 m.); Kaiserslautern, 536 kc/s (560 m.); and Nürnberg, 1,256 kc/s (239 m.).

Transmits at intervals from 5.45 a.m.
 6.30 p.m. (from Nürnberg).—Choral Concert, by the Nürnberg Municipal Officials' Choral Society.
 7.0 p.m.—"Der böse Geist Lim-pazivagabundia"—a Magic Farce, with Songs in Three Acts (Nestroy)—Music by Adolf Müller.
 9.0 p.m.—The Wireless Reporter calls the Wireless Watch to his Aid—a Relay from a Private House.
 9.20 p.m.—Time, Weather, News and Sports Notes.

OSLO (Norway)
 Kringkastingselskapet. 280 kc/s (1,071 m.); 75 kW. Relayed by Fredrikstad, 815 kc/s (368 m.); Hamar, 511 kc/s (587 m.); Nottodden, 671 kc/s (447.1 m.); and Rjukan, 671 kc/s (447.1 m.).

Transmits at intervals from 10.10 a.m.
 6.15 p.m.—Weather and News.
 6.30 p.m.—English Language Lesson.
 7.0 p.m.—Time Signal.
 7.2 p.m.—Orchestral Concert.
 8.5 p.m.—A Comedy.
 8.35 p.m.—Weather, News and Topical Talk.
 9.5 p.m.—Old Dance Music.

PARIS (France)
 Eiffel Tower (FLE). 207 kc/s (1,445 m.); 15 kW.
 9.30 a.m.—Time Signal on 113.2 kc/s (2,650 m.).
 9.36 a.m.—Time Signal on 113.2 kc/s (2,650 m.).
 5.45 p.m.—Le Journal Parlé.

7.10 p.m.—Weather Forecast.
 7.20 p.m.—Concert from the Works of Alfredo Casella, with the collaboration of the Composer. Talk on Alfredo Casella. Serenade for Clarinet, Bassoon, Trumpet, Violin and Cello. Songs: (a) En ramant, (b) Sonnets. Sonata for Cello and Pianoforte. Three Songs: (a) Vocalise, (b) Loin de la belle cage, and (c) Je suis follement amoureux de vous. (Two Fourteenth-Century Poems.) Pianoforte Duets: Pupazzetti. Minuet for Violin and Pianoforte. Gramophone Record: Selection from the Ballet, "La Jarre."
 10.30 p.m.—Time Signal on 113.2 kc/s (2,650 m.).
 10.36 p.m.—Time Signal on 113.2 kc/s (2,650 m.).

PARIS (France)
 Poste Parisien. 914 kc/s (329 m.); 1.2 kW.
 9.0 a.m.—Transmission of Pictures.
 8.25 p.m.—Gramophone Records, Talk and News Bulletin.
 9.0 p.m.—Concert. Overture, "A Night in May" (Rimsky-Korsakoff). Third Ballad for Pianoforte (Chopin). Minuet and Finale from the Jupiter Symphony (Mozart). Popular Russian Songs (Liadoff). Waltz, A la française (Gédalge). Elegy (Rachmaninoff). Divertissement flamand (Vidal).

PARIS (France)
 Radió-Paris (CFR). 174 kc/s (1,725 m.); 17 kW.
 Transmits at intervals from 6.45 a.m.
 12.30 p.m.—Gramophone Concert of Chamber Music. In the intervals at 1.0 p.m.—Exchange Quotations and News, and at 1.30 p.m.—Exchange Quotations.
 2.0 p.m.—Exchange; Market Prices.
 3.30 p.m.—Exchange Quotations.
 3.45 p.m.—Gramophone Concert.
 4.55 p.m.—News and Exchange Quotations.
 6.6 p.m.—Agricultural Report and Receipts Results.
 6.25 p.m.—Market Prices.
 6.30 p.m.—Gramophone Concert.
 7.0 p.m.—Talk on English Literature.
 7.30 p.m.—Elementary German Lesson.
 7.45 p.m.—Commercial Prices, Economic and Social Notes and News.

8.0 p.m.—Concerto for Violin and Orchestra (Mendelssohn).
 8.30 p.m.—Sports Review and News.
 8.45 p.m.—Orchestral Concert from the Works of Messager, with Commentary by M. Jean Chantavoine.
 9.15 p.m.—Press Review, News and Time Signal.

POZNAŃ (Poland)
 896 kc/s (335 m.); 1.9 kW. Also relayed on 9,830 kc/s (30.5 m.) from 12.5—1.0 p.m.
 Transmits at intervals from 6.0 a.m.
 6.0 p.m.—Elementary French Lesson.
 6.15 p.m.—Talk by Kazimierz Mayer.
 6.30 p.m.—Miscellaneous Items and News.
 6.50 p.m.—Programme from Warsaw. In the intervals, Theatre Review and Station Notes.
 9.45 p.m.—Time, News, Sports and Police Notes.
 10.0 p.m.—Dance Music from the Café "Włopolanka."
 11.0 p.m. (approx.).—Close Down.

PRAGUE (Czechoslovakia)
 Stranice. 617 kc/s (487 m.); 5.5 kW. Relayed at intervals by Brno, 878 kc/s (342 m.); Bratislava, 1,076 kc/s (279 m.) and Moravská-Ostrava, 1,139 kc/s (263 m.).
 Transmits at intervals from 10.15 a.m.
 6.15 p.m.—News Bulletin.
 6.20 p.m.—Talk: The Protection of Mothers in Czechoslovakia.
 6.30 p.m.—Saxophone Solos.
 6.50 p.m.—Symphony Concert from Bratislava.

9.0 p.m.—Time, News and Sports Notes.
 9.15 p.m.—News, Theatre Notes and Programme Announcements.
 9.20 p.m.—Programme (to be announced) from Moravská-Ostrava.
 10.0 p.m.—Time, News and Chimes.

ROME (Italy)
 Ente Italiano Audizioni Radiofoniche (IRO). 680 kc/s (441 m.); 75 kW. Relayed by Naples, 905 kc/s (332 m.), and ZRO, 11,810 kc/s (25.4 m.).
 Transmits at intervals from 7.15 a.m.
 6.30 p.m.—Wireless Technical Lesson.
 6.50 p.m.—Gioniale Radio, News and Sports Notes.
 7.0 p.m.—Announcements and Press Review.
 7.30 p.m.—Time Signal.

7.45 p.m. (approx.).—Relay of an Opera from the Royal Theatre or the Teatro San Carlo, Naples. Talk: Life and the Theatre and Announcements in the intervals.
 9.55 p.m. (approx.).—Close Down.

STOCKHOLM (Sweden)
 Radiotjänst (SASA). 680 kc/s (436 m.); 75 kW. Relayed by Boden, 250 kc/s (1,200 m.); Göteborg, 932 kc/s (322 m.); Hörby, 1,166 kc/s (257 m.); Motala, 222.5 kc/s (1,348 m.); Östersund, 389 kc/s (770 m.); Sundsvall, 554 kc/s (542 m.).
 Transmits at intervals from 6.15 a.m.
 5.30 p.m.—Gramophone Records.
 6.30 p.m.—Talk on Bees.
 7.0 p.m.—Orchestral Concert. Overture, "The Cunning Peasant" (Dvorák). Potpourri of Operatic-Comique Melodies (Eysler-Hruby). Waltz, Krolls-Balklänge (Lumbye). Two Dances from "The Queen's Kerchief" (Joh. Strauss). Old Bohemian Dance (Hilmar). Moonlight Night (Novák). Selection from "Schwanda the Piper" (Weinberger). Selection (O. Straus). Overture, "Lysistrata" (Lincke).
 8.40 p.m.—Talk: Carl Christoffer Gjörwell.
 9.10 p.m.—Sonata in A Major, Op. 13, for Violin and Piano (Fauré).
 9.40 p.m. (approx.).—Close Down.

STRASBOURG (France)
 Radio-Strasbourg (P.T.T.). 869 kc/s (345 m.); 15 kW.
 Transmits at intervals from 11.0 a.m.
 6.15 p.m.—Gramophone Concert.
 7.15 p.m.—News in French and German.
 7.30 p.m.—Instrumental Concert.
 8.30 p.m.—News Bulletin.
 8.35 p.m.—Instrumental Concert.
 10.30 p.m. (approx.).—Close Down.

TOULOUSE (France)
 Radiophonie du Midi. 779 kc/s (385 m.); 8 kW.
 Transmits at intervals from 12.45 p.m.
 6.0 p.m.—Transmission of Pictures.
 6.15 p.m.—Exchange Quotations.
 6.30 p.m.—Dance Music Programme.
 6.45 p.m.—Market Prices.
 7.0 p.m.—Selections for Hawaiian Guitar.
 7.15 p.m.—Vocal Tangos.

7.30 p.m.—News and Market Prices.
 7.45 p.m.—Selections by a Viennese Orchestra.
 8.5 p.m.—Programme of Chansonnettes.
 8.25 p.m.—Gramophone Records.
 8.55 p.m.—Fashion Notes.
 9.0 p.m.—Time Signal.
 9.2 p.m.—Concert of Operetta Music. Selections from "Frederica" (Lehár), "La Mascotte" (Audran), "Die Bajadere" (Kálmán), "Rip van Winkle" (Planquette), and "Les Cloches de Corneville" (Planquette). In the interval, The Glow-Worm Gavotte (Lincke).
 9.30 p.m.—Musical Programme.
 10.0 p.m.—Dance Music from the Café Sion.
 11.0 p.m.—North African News.
 11.15 p.m.—Symphony Music.
 11.30 p.m.—Dance Music.
 12 midnight.—News and Close Down.

VIENNA (Austria)
 Radio-Wien. 581 kc/s (517 m.); 20 kW. Relayed by Graz, 851 kc/s (352 m.); Innsbruck, 1,058 kc/s (283 m.); Klagenfurt, 662 kc/s (453.2 m.); Linz, 1,220 kc/s (246 m.); and Salzburg, 1,373 kc/s (218 m.).
 Transmits at intervals from 8.20 a.m.
 6.0 p.m.—Elementary English Lesson.
 6.25 p.m.—Time, Weather, Alpine Weather Report and Programme Announcements.
 6.30 p.m.—The Cultural History of Dancing—Introductory Talk.
 7.0 p.m.—Recital of Arias, Songs and Duets, relayed from the Music Society's Hall.
 8.50 p.m. (approx.).—News Bulletin.
 9.0 p.m. (approx.).—Orchestral Concert.

WARSAW (Poland)
 Polskie Radio. 212 kc/s (1,411 m.); 14 kW.
 Transmits at intervals from 10.40 a.m.
 6.10 p.m.—Agricultural Report.
 6.25 p.m.—Gramophone Records.
 6.30 p.m.—Programme Announcements.
 6.35 p.m.—Radio Journal.
 6.50 p.m.—"The Pearl Fishers"—Opera (Bizet), relayed from the Grand Theatre. In the interval, Theatre Review. After the Programme, Weather, Police and Sports Notes and Relay of Foreign Stations (218 m.).



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PROGRAMMES FOR WEDNESDAY (February 11)

NOTE: THE HOURS OF TRANSMISSION ARE REDUCED TO GREENWICH MEAN TIME

ALGIERS (N. Africa)
825.3 kc/s (363.4 m.); 13 kW.
Transmits at intervals from 12.30 p.m.
7.15 p.m.—Russian Songs.
7.30 p.m.—News Bulletin.
7.45 p.m.—Chansonnette Recital.
8.0 p.m.—Orchestral Concert.
8.30 p.m.—Review of New Books.
8.45 p.m.—Symphony Concert.
10.0 p.m.—Gramophone Records.

BARCELONA (Spain)
Radio-Barcelona. (EAJ1). 860 kc/s (349 m.); 18 kW.
Transmits at intervals from 8.0 a.m.
6.0 p.m.—Trio Music and News.
7.0 p.m.—Gramophone Records.
8.30 p.m.—Elementary French Lesson.
9.0 p.m.—Chimes, Weather, Exchange Quotations and Part Relay of an Opera from the Gran Teatro del Liceo. News in the interval.
12 midnight (approx.)—Close Down.

BERLIN (Germany)
Königs Wusterhausen. 183 kc/s (1,635 m.); 35 kW.
Transmits at intervals from 5.20 a.m.
3.30 p.m.—Programme from Hamburg.
4.30 p.m.—Talk: Nuntius, the Abbot of Himmelwitz.
5.0 p.m.—Talk: German for Germans.
5.30 p.m.—Educational Talk: An Introduction to Modern Philosophy.
6.0 p.m.—See Berlin (Witzleben).
6.25 p.m.—Weather for Farmers.
6.30 p.m.—Programme from Leipzig.
7.30 p.m.—Talk with Gramophone Illustrations: Great Actors.
8.0—11.30 p.m.—Programme from Berlin (Witzleben).
11.30 p.m. (approx.)—Close Down.

BERLIN (Germany)
Witzleben. 716 kc/s (418 m.); 1.7 kW.
Transmits at intervals from 6.0 a.m.
6.0 p.m.—Legal Talk.
6.30 p.m.—Programme from Heilsberg.
7.30 p.m.—Topical Talk.
8.0 p.m.—News; Sports Notes.
8.10 p.m.—Vocal and Instrumental Concert of Operatic Music, with Introductory Talk.
9.15 p.m.—Weather, News and Sports Notes.
9.30 p.m. (approx.)—Dance Music relayed from the Femina.
11.30 p.m. (approx.)—Close Down.

BERNE (Switzerland)
Radio-Bern. 743 kc/s (403 m.); 1.1 kW.
Transmits at intervals from 9.45 a.m.
6.0 p.m.—Talk: Theoretical Training for Young Business People.
6.28 p.m.—Time and Weather.
6.30 p.m.—Hungarian National Evening. Talk: The History and Importance of Hungary.
7.0 p.m.—Programme from Budapest.
9.0 p.m.—News and Weather.
9.15 p.m.—Late Concert.
9.40 p.m. (approx.)—Close Down.

BRESLAU (Germany)
923 kc/s (325 m.); 1.7 kW. Relay by Gleiwitz, 1,184 kc/s (253 m.).
Transmits at intervals from 10.15 a.m.
6.5 p.m.—Weather for Farmers, followed by Orchestral Concert.
6.40 p.m.—Weather Report and Vocal Quartet Concert, relayed from Gleiwitz.
7.25 p.m.—Concert of Hungarian Music. Overture, Kossuth (Kerner). Magyar estek (Agghazy). Overture, Eine Vision (Lehár). Pianoforte Solo: Bilder aus Ungarn (Liszt). Hungarian Folk Melodies (arr. Tauber). Czardas, Hüllamzó balaton (Hubay). Overture, "Hunyadi László" (Erkel).
8.0 p.m.—News Bulletin.
8.10 p.m.—Orchestral Concert of Light Music.
9.20 p.m.—Time, Weather, News, Sports Notes and Programme Announcements.
9.30 p.m.—Shorthand Lesson.
9.45 p.m.—Talk: Achievements and Records.
10.0 p.m. (approx.)—Close Down.

BRUSSELS (Belgium)
Radio-Belgique. 590 kc/s (500 m.); 15 kW.
5.0 p.m.—Organ Recital.
5.45 p.m.—Gramophone Records dedicated to Hungary.
6.43 p.m.—Le Journal Parlé.
7.0 p.m.—Gramophone Records.
7.15 p.m.—Talk by M. Maquet.
7.30 p.m.—Gramophone Records.

7.45 p.m.—Le Journal Parlé.
8.0 p.m.—Pianoforte Recital.
8.30 p.m.—Symphony Concert. In the interval, Talk.
10.0 p.m.—News and Weather.

BRUSSELS No. 2 (Belgium)
887 kc/s (338.2 m.); 12 kW. (Programme in Flemish.)
5.0 p.m.—Gramophone Records of Hungarian Music.
6.0 p.m.—Dance Music from the Chantilly Tea-Room, Antwerp.
6.30 p.m.—Song Recital.
6.45 p.m.—Le Journal Parlé.
7.0 p.m.—Gramophone Records.
7.15 p.m.—Talk by M. Ernest Claes.
7.30 p.m.—Gramophone Records.
7.45 p.m.—Le Journal Parlé.
8.0 p.m.—Concert of Military Music and Songs. In the interval at 8.45 p.m.—Theatre Review.
10.0 p.m.—Le Journal Parlé.

BUCHAREST (Romania)
Radio-Bucarest. 761 kc/s (394 m.); 16 kW.
Transmits at intervals from 11.0 a.m.
6.0 p.m.—Gramophone Records.
6.30 p.m.—French Language Lesson.
7.0 p.m.—Hungarian National Evening—Symphony Concert. Overture, "Sakuntala" (Goldmark). Concerto for Piano and Orchestra (Liszt). Les Préludes (Liszt). Scenes from the Czardas, for Violin and Orchestra (Hubay). In the interval at 7.30 p.m.—Talk.
8.45 p.m.—News Bulletin.

BUDAPEST (Hungary)
545 kc/s (550 m.); 23 kW.
Transmits at intervals from 8.15 a.m.
5.45 p.m.—Italian Language Lesson.
6.20 p.m.—The Letter Box.
7.0 p.m.—Hungarian National Evening. Symphony to Dante's "Divina Commedia" (Liszt) for Choir and Orchestra, directed by Dr. Erno Dohnanyi. Hungarian Melodies by a Tzigane Orchestra.

COLOGNE (Germany)
Westdeutscher Rundfunk. 1,319 kc/s (227 m.); 1.7 kW.
See Langenberg Programme.

COPENHAGEN (Denmark)
1,067 kc/s (281 m.); 1 kW. Relay by Kalundborg, 260 kc/s (1,153 m.).
Transmits at intervals from 6.30 a.m.
2.0 p.m.—Orchestral Concert from the Hotel d'Angleterre.
2.45 p.m. (in the interval)—Programme for Children.
4.40 p.m.—Exchange Quotations and Market Prices.
4.50 p.m.—Talk: Benzine and Oil in the World Market.
5.20 p.m.—French Language Lesson.
5.50 p.m.—Weather and News.
6.15 p.m.—Time Signal.
6.24 p.m.—Report of the Non-Political Danish Radio Club.
6.30 p.m.—Gardening Talk from the Odense Studio.
7.0 p.m.—Town Hall Chimes.
7.2 p.m.—Eighteenth Concert from the Axelborg Studio. Programme from the Works of Wagner. Overture, "Tannhäuser." Elisabeth's Aria and Duet of Elisabeth and Tannhäuser from "Tannhäuser." Hans Sachs' Monologue from the Second Act of "The Mastersingers." Prelude, "Lohengrin." Wotan's Farewell and Fire Magic from "The Valkyrie." Siegfried's Rhine Journey from "The Twilight of the Gods." Siegfried's Song at the Forge, from "Siegfried." The Entry of the Gods into Valhalla, from "The Rhinegold."
9.0 p.m.—News Bulletin.
9.15 p.m.—Dance Music from the Wivel Restaurant.
11.0 p.m. (in the interval)—Town Hall Chimes.
11.30 p.m. (approx.)—Close Down.

CORK (Ireland)
(6CK). 1,337 kc/s (225 m.); 1.5 kW.
1.30 p.m.—Weather Forecast and Gramophone Records.
6.0 p.m.—Exchange, News Bulletin and Gramophone Records.
6.15 p.m.—Programme from Dublin.

CRACOW (Poland)
Polskie Radio. 1,229 kc/s (244 m.); 1.5 kW.
Transmits at intervals from 10.45 a.m.
6.10 p.m.—Agricultural Report.
6.25 p.m.—Gramophone Records.
6.35 p.m.—Radio Journal.
6.45 p.m.—Talk from Warsaw.
7.0 p.m.—International Concert, relayed from Budapest.
8.5—11.0 p.m.—Programme from Warsaw.
11.0 p.m. (approx.)—Close Down.

DUBLIN (Ireland)
(2RN). 725 kc/s (413 m.); 1.5 kW.
1.30 p.m.—Time, Weather, Stock Report and Gramophone Concert.
6.0 p.m.—Gramophone Records.
6.15 p.m.—Programme for Children.
7.0 p.m.—Gramophone Records.
7.20 p.m.—News Bulletin.
7.30 p.m.—Time and Irish Lesson.
7.45 p.m.—German Language Lesson.
8.0 p.m.—Concert by the No. 1 Army Band, conducted by Colonel Fritz Brasc.
9.0 p.m.—M. André Alphon presents "L'Anglais tel qu'on le parle"—One Act Vaudeville.
9.30 p.m.—Sponsored Programme.
10.30 p.m.—Time, News, Weather and Close Down.

FRANKFURT-am-MAIN (Germany)
770 kc/s (390 m.); 1.7 kW. Relay by Cassel, 1,220 kc/s (246 m.).
Transmits at intervals from 5.15 a.m.
6.10 p.m.—Time, Weather and Economic Notes.
6.15 p.m.—See Mühlacker Programme.
6.45 p.m.—Talk: The Instruments of an Orchestra—Percussion Instruments.
7.15 p.m.—Paul Ernst reads from his own Works.
7.45 p.m.—"Hungary"—Vocal and Instrumental Selections and Talk. Observations on Hungary, by Ludwig Hatvany. Hungarian Folk Songs (arr. Béla Bartók). Sonata for Cello Solo, Op. 8 (Kodaly). Tzigane Music from Budapest. Hungarian Literature (German Translation by S. Klein). Monodramas—Woman's Tales (D. Kosztolányi).
9.45 p.m.—Time, Weather, News and Sports Notes.
10.10 p.m.—See Mühlacker Programme.
10.30 p.m. (approx.)—Close Down.

HAMBURG (Germany)
Norag (ha, in Morse). 806 kc/s (372 m.); 1.7 kW. Relay by Bremen, 1,112 kc/s (270 m.); Flensburg, 1,373 kc/s (218 m.); Hanover, 530 kc/s (566 m.); and Kiel, 1,292 kc/s (232.2 m.).
Transmits at intervals from 5.20 a.m.
3.0 p.m.—Love Duets—Vocal and Orchestral Concert. Selection from "La Traviata" (Verdi). Duet from "Rigoletto" (Verdi). Overture and Duet, "The Barber of Baghdad" (Cornelius). Faust, Waltz (Gounod). Duet from "Madame Butterfly" (Puccini). Duet from "The Gipsy Baron" (Joh. Strauss). Duet from "Der Betelstudent" (Müllöcker). Waltz from "The Merry Widow" (Lehár). Duet from "The Count of Luxembourg" (Lehár). Waltz from "The Czardas Princess" (Kálman).
4.30 p.m. (from Kiel)—Talk: Germans in Strange Surroundings—Germans in the North Mark.
4.55 p.m. (from Kiel)—Talk for Workers: The Foreman of the Works in Small Businesses.
5.15 p.m.—Variety Programme.
6.0 p.m. (from Kiel)—Talk: The Life and Works of Timm Kröger.
6.25 p.m.—Exchange; Market Prices.
6.30 p.m.—Talk on Topical Questions.
6.55 p.m.—Weather Report.
7.0 p.m.—"An American Radio Film" (Winston G. Hopkins).
8.0 p.m.—Hans Gal Concert, conducted by the Composer. Pianoforte Quartet in B Flat Major, Op. 13, the Composer at the Pianoforte. Five Songs, the Composer at the Pianoforte. Orchestral Selection: Serbian Melodies.
9.0 p.m.—News Bulletin.
9.30 p.m.—The Grand Potpourri—Musical and Literary Revue.

HEILSBURG (Germany)
1,085 kc/s (276.5 m.); 75 kW. Relay by Danzig, 662 kc/s (453 m.).
Transmits at intervals from 5.30 a.m.
3.30 p.m.—Orchestral Concert.
4.45 p.m.—Talk: Kant's Relations with Men.
5.10 p.m.—Ice Report and Market Prices.
5.30 p.m.—Talk on Health: Alcohol and the Nervous System.
6.0 p.m.—Shorthand Dictation.
6.25 p.m.—Weather Report.
6.30 p.m.—Concert of Hungarian Music. Conducted by Dr. Hermann Scherchen. Symphonic Poem, Zrinyi (Goldmark). Archaic Dances (Lendvai). Suite, Hary Janos (Kodaly). Symphonic Poem, Hungaria (Liszt).

KALUNDBORG (Denmark)
Kalundborg Radio. 260 kc/s (1,153 m.); 10 kW.
See Copenhagen Programme.

KATOWICE (Poland)
Polskie Radio. 734 kc/s (408 m.); 16 kW.
Transmits at intervals from 10.40 a.m.
6.0 p.m.—Announcements, Programme Notes, Theatre Review and Amusement Guide.
6.15 p.m.—Talk: The Silesian Housewife.
6.30 p.m.—Sports Notes.
6.35 p.m.—Press Review.
6.45 p.m.—Programme from Warsaw.
9.20 p.m.—Reading.
9.50 p.m.—Weather, Programme Announcements in French and News.
10.0 p.m.—The Letter Box in French.

7.35 p.m. (from Danzig)—"A Little Destiny Revue." (Alice Eckert—Rothholz—Music by J. Hanne-mann).
8.25 p.m.—"I Paghacci"—Opera in Two Acts and a Prologue (Leon-cavallo), relayed from the Opera House, Königsberg.
9.30 p.m. (approx.)—Weather, News and Sports Notes, followed by Dance Music from Berlin (Witzleben).
11.30 p.m. (approx.)—Close Down.

HILVERSUM (Holland)
160 kc/s (1,875 m.); 8.5 kW. (transmitted from Huizen).
7.40 a.m. till Close Down.—Programme of the Workers' Radio Society (V.A.R.A.).
7.40 a.m.—Gramophone Records.
9.10 a.m.—Organ Recital.
9.40 a.m.—Divine Service (arranged by the Liberal Protestant Radio Society).
10.10 a.m.—Talk by Mr. Kers.
10.40 a.m.—Gramophone Records.
10.45 a.m.—Talk by Mme. Heybroek-d'Ancona.
11.15 a.m.—Gramophone Records.
11.40 a.m.—Police Notes.
11.55 a.m.—Septet Concert and Gramophone Records.
1.15 p.m.—Gramophone Records.
2.5 p.m.—Programme for Women.
2.55 p.m.—Gramophone Records.
3.0 p.m.—Talk by Mr. de la Bella.
3.15 p.m.—Gramophone Records.
3.20 p.m.—Dressmaking Lesson.
4.10 p.m.—Programme for Children.
4.55 p.m.—Gramophone Records.
6.10 p.m.—Mandoline Lesson.
6.40 p.m.—Talk by Dr. Jordan.
7.10 p.m.—Police Notes.
7.25 p.m.—Demonstration on an Automatic Accordion.
7.40 p.m.—Gramophone Records.
7.50 p.m.—Accordion Selections (continued).
8.5 p.m.—Gramophone Records.
8.15 p.m.—Programme arranged by the Dutch Factory Workers' Association. Songs, Recitations and Address.
9.15 p.m.—Gramophone Records.
9.20 p.m.—Orchestral Concert.
9.50 p.m.—"The Bells"—a Wireless Play (Oehlenschlaeger and Nostay).
10.20 p.m.—Concert (continued).
10.50 p.m.—News Bulletin.
11.0 p.m.—Gramophone Records.

HUIZEN (Holland)
1,004 kc/s (298 m.); 8.5 kW. (transmitted from Hilversum).
7.55 a.m. till Close Down.—Programme of the Christian Radio Society (N.C.R.V.). Frisian Day.
7.55 a.m.—Carillon Recital.
8.40 a.m.—Bible Reading in Frisian.
9.10 a.m.—Organ Recital from the Koepelkerk, Leeuwarden.
10.10 a.m.—Service for Hospitals.
10.40 a.m.—Readings in Frisian.
11.40 a.m.—Concert by the Mixed Choir of Oosterend.
1.40 p.m.—Agricultural Talk.
2.20 p.m.—Gramophone Records.
2.25 p.m.—Agricultural Talk.
2.40 p.m.—Orchestral Concert.
3.10 p.m.—Reading.
3.40 p.m.—Choral Concert.
4.10 p.m.—Reading (continued).
4.40 p.m.—Orchestral Concert (continued).
5.10 p.m.—Choral Concert (continued).
5.40 p.m.—Programme arranged by the Frisian Christian Society. Songs and Addresses.
7.40 p.m.—Soprano and Organ Recital, with talks from the Grootte Kerk, Leeuwarden.
10.10 p.m. (in the interval)—News Bulletin.
11.10 p.m. (approx.)—Close Down.

KALUNDBORG (Denmark)
Kalundborg Radio. 260 kc/s (1,153 m.); 10 kW.
See Copenhagen Programme.

KATOWICE (Poland)
Polskie Radio. 734 kc/s (408 m.); 16 kW.
Transmits at intervals from 10.40 a.m.
6.0 p.m.—Announcements, Programme Notes, Theatre Review and Amusement Guide.
6.15 p.m.—Talk: The Silesian Housewife.
6.30 p.m.—Sports Notes.
6.35 p.m.—Press Review.
6.45 p.m.—Programme from Warsaw.
9.20 p.m.—Reading.
9.50 p.m.—Weather, Programme Announcements in French and News.
10.0 p.m.—The Letter Box in French.

KAUNAS (Lithuania)
Radio-Kaunas. 155 kc/s (1,935 m.); 7 kW.
Transmits at intervals from 3.0 p.m.

6.10 p.m.—Talk by J. Geniusas.
6.30 p.m.—Musical Programme.
8.0 p.m.—Talk: Winter Thoughts.
8.20 p.m.—Evening Concert.

KÖNIGSBERG (Germany)
Ostmarken Rundfunk. 1,387 kc/s (216.3 m.); 1.7 kW.
See Heilsberg Programme.

LAHTI (Finland)
167 kc/s (1,796 m.); 54 kW. Relay by Helsingfors, 1,355 kc/s (221 m.).
Transmits at intervals from 10.0 a.m.
5.40 p.m.—Choral Concert.
6.0 p.m.—Hungarian National Evening. Talk (to be announced).
6.20 p.m.—Orchestral Concert. Overture, Hunyadi László (Erkel). Hungarian Melodies.
6.40 p.m.—Hungarian Songs.
7.0 p.m.—Poetry Recital.
7.20 p.m.—Orchestral Concert. Hungarian Rhapsodies Nos. 12 and 2 (Liszt).
7.45 p.m.—News in Finnish and Swedish and Close Down.

LANGENBERG (Germany)
Westdeutscher Rundfunk. 635 kc/s (473 m.); 17 kW. Relay by Aachen, Cologne and Münster, 1,319 kc/s (227 m.).
Transmits at intervals from 5.45 a.m.
6.0 p.m.—Weather, Time, Economic and Sports Notes.
6.15 p.m.—Topical Talk.
6.25 p.m.—Talk on West German Workers: Iron and Rolling-Mill Workers in the Siegerland.
7.0 p.m.—Hungarian National Evening, relayed from Budapest, followed by News and Sports Notes.
9.25 p.m.—Baritone Recital of Hungarian Folk Songs.
9.45 p.m.—Military Band Concert, relayed from Budapest.

LEIPZIG (Germany)
Mitteldeutscher Rundfunk. 1,157 kc/s (259 m.); 2.3 kW. Relay by Dresden, 941 kc/s (319 m.).
Transmits at intervals from 9.0 a.m.
6.0 p.m.—Talk: The German Business Man and the World Market.
6.30 p.m.—Concert of Light Music. Overture, "Marinarella" (Fucik). Ballet Music from "Austin" (Marschner). Selection from "Mephistopheles" (Boito). Waltz, Das Leben ein Tanz (Joh. Strauss).
7.30 p.m.—I. E. Poritzky reads from his own Works.
8.0 p.m.—Topical Talk.
8.5 p.m.—Tzigane Music from Budapest.
9.0 p.m.—News Bulletin, followed by Concert from the Works of Women Composers.
10.20 p.m. (approx.)—Close Down.

LJUBLJANA (Yugoslavia)
Radio Ljubljana. 522 kc/s (574.7 m.); 2.8 kW.
Transmits at intervals from 11.15 a.m.
6.0 p.m.—Russian Language Lesson.
6.30 p.m.—Literary Programme.
7.0 p.m.—Talk on the Sokol.
7.30 p.m.—Talk: The Popular Slovene Song.
8.0 p.m.—Orchestral Concert.
9.0 p.m.—Weather and News.

MADRID (Spain)
Union Radio (EAJ7). 707 kc/s (424 m.); 2 kW.
Transmits at intervals from 8.0 a.m.
7.0 p.m.—Chimes, Exchange Quotations, Market Prices and Talk for Women.
7.30 p.m.—Orchestral Dance Music.
8.25 p.m.—News Bulletin.
8.30—9.15 p.m.—Interval.
9.15 p.m.—Lesson in English Pronunciation.
9.30 p.m.—Chimes, Time, Exchange Quotations and Concert of Opera Music. Selections from "Faust" (Gounod), "Cavalleria rusticana" (Mascagni), "The Pearl Fishers" (Bizet), and "L'Africaine" (Meyerbeer).
10.0 p.m.—Band Concert from the Hotel Nacional, followed by News Bulletin.
12 midnight.—Chimes and Close Down.

MILAN (Italy)
Ente Italiano Audizioni Radiofoniche. 599 kc/s (501 m.); 8.5 kW. Programme relayed by Turin, 1,013 kc/s (296 m.), and Genoa, 958 kc/s (313.2 m.).
Transmits at intervals from 7.15 a.m.
6.20 p.m.—Announcements.
6.30 p.m.—Programme of Light Music.
7.15 p.m.—Giornale Radio; Weather.
7.30 p.m.—Time Signal.
7.32 p.m.—Musical Selections.
7.45 p.m.—Concert of Chamber Music.

Programmes for Wednesday—(Cont.)

8.50 p.m.—Talk on the Scientific Organisation of Work.
 9.0 p.m.—Operetta Selections.
 10.0 p.m.—Giornale Radio, followed by Concert from the Sala Gay, Turin.
 10.55 p.m.—News Bulletin.
MOTALA (Sweden)
 222.5 kc/s (1,348 m.); 40 kW. See Stockholm Programme.
MÜHLACKER (Germany)
 Süddeutscher Rundfunk. 833 kc/s (360 m.); 75 kW. Relayed by Freiburg, 527 kc/s (576 m.).
 Transmits at intervals from 5.15 a.m.
 6.10 p.m.—Time Signal.
 6.15 p.m.—Talk: Modern Physics.
 6.45—9.45 p.m.—Programme from Frankfurt.
 9.45 p.m.—Programme Announcements, News and Weather.
 10.10 p.m.—Relays from the Stuttgart Six Days' Racing.
 10.30 p.m. (approx.).—Close Down.
MUNICH (Germany)
 563 kc/s (533 m.); 1.7 kW. Relayed by Augsburg, 536 kc/s (560 m.); Kaiserlautern, 536 kc/s (560 m.); and Nürnberg, 1,256 kc/s (239 m.).
 Transmits at intervals from 5.45 a.m.
 6.15 p.m.—Talk: Ten Years of the Bavarian Provinzial Theatre.
 6.30 p.m.—Gramophone Records.
 7.15 p.m.—Hungarian National Evening—Concert and Recitations. Heroic March (Liszt). Rhapsody in A Minor (Dohnanyi). Folk Songs (arr. Béla Bartók). Readings from Hungarian Lyrics. Rhapsody (Liszt).
 8.5 p.m.—Zigane Music, relayed from Budapest.
 9.0 p.m.—Talk: The Height of the Season in Berlin.
 9.20 p.m.—Time, Weather, News and Sports Notes.
 9.45 p.m.—Orchestral Dance Music, from the Café Stadt Wien.
 11.0 p.m. (approx.).—Close Down.
OSLO (Norway)
 Kringkastingselskapet. 280 kc/s (1,071 m.); 75 kW. Relayed by Fredriksstad, 815 kc/s (368 m.); Hamar, 551 kc/s (587 m.); Notodden, 671 kc/s (447.1 m.); Porsgrund, 662 kc/s (453 m.), and Rykan, 671 kc/s (447.1 m.).
 Transmits at intervals from 10.10 a.m.

7.0 p.m.—Time Signal.
 7.2 p.m.—Hungarian National Evening.
 8.0 p.m.—Orchestral Concert.
 8.35 p.m.—Weather, News and Topical Talk.
 9.5 p.m.—Talk on Bridge, relayed from Aalesund, 671 kc/s (447.1 m.).
 9.35 p.m.—Relay of Foreign Stations.
PARIS (France)
 Eiffel Tower (FLE). 207 kc/s (1,445 m.); 15 kW.
 9.30 a.m.—Time Signal on 113.2 kc/s (2,650 m.).
 9.36 a.m.—Time Signal on 113.2 kc/s (2,650 m.).
 5.45 p.m.—Le Journal Parlé.
 7.10 p.m.—Weather Forecast.
 7.20 p.m.—Concert under the direction of M. Edouard Flament. Dans la forêt (Poppéi-Salabert). Violin Solo: La Course dans la forêt et le réveil des fleurs (Ed. Flament). Promenade en forêt (Christiné). Tales from the Vienna Woods (J. Strauss).
 8.0 p.m.—Variety Programme.
 10.30 p.m.—Time Signal on 113.2 kc/s (2,650 m.).
 10.36 p.m.—Time Signal on 113.2 kc/s (2,650 m.).
PARIS (France)
 Poste Parisien. 914 kc/s (329 m.); 1.2 kW.
 9.0 a.m.—Transmission of Pictures.
 8.25 p.m.—Gramophone Records, Talk and News Bulletin.
 9.0 p.m.—Concert. Overture, "Le petit duc" (Lecocq). Staccato Waltz (Godard). Selection from "Josephine vendue par ses soeurs" (Roger). Cavatina (Raff). Selection from "La Bohème" (Leoncavallo). Bruyères from the "Préludes" (Debussy). Musiques foraines (Florent Schmitt). Chanson pour berger (M. S. Rousseau). First Suite from "La Fête chez Thérèse" (Hahn). Crépuscule (Doret). March, The Cadets (Sousa).
PARIS (France)
 Radio-Paris (CFR). 174 kc/s (1,725 m.); 17 kW.
 Transmits at intervals from 6.45 a.m.
 12.30 p.m.—Gramophone Concert. In the intervals at 1.0 p.m.—Exchange Quotations and News, and at 1.30 p.m.—Exchange Quotations.

2.0 p.m.—Exchange; Market Prices.
 3.30 p.m.—Exchange Quotations.
 3.45 p.m.—Gramophone Concert.
 4.55 p.m.—News and Exchange Quotations.
 6.0 p.m.—Agricultural Report and Racing Results.
 6.25 p.m.—Market Prices.
 6.30 p.m.—Gramophone Concert.
 7.0 p.m.—Talk on Horticulture.
 7.15 p.m.—Literary Review: "L'ennemie intime" (Marcelle Tinayre).
 7.30 p.m.—Medical Talk: How to Protect Children from Measles.
 7.45 p.m.—Commercial Prices, Economic and Social Notes and News.
 8.0 p.m.—Literary Readings.
 8.30 p.m.—Sports Review.
 8.45 p.m.—Gramophone Records.
 9.0 p.m.—Concert from the Old Conservatoire. Harpsichord Solos: (a) Gavotte and Variations (Rameau), (b) Le bavolet flottant and (c) Les Moissonneurs (Couperin), (d) Sonata (Paradies). Quartet in E Minor for Flute, Violin, Cello and Bass (Telemann). Concerto for Harpsichord, Two Violins and Cello (Bach, arranged by Mme. Roesgen-Champion). Programme from the Works of Marguerite Roesgen-Champion. Suite for Two Flutes. Sur la naissance de notre seigneur—Women's Voices and Piano. Nocturne for Three Women's Voices, String Orchestra and Drum. Harpsichord Solos played by the Composer: (a) Sarabande, (b) Intermezzo, (c) Danse rustique. Quartet for Strings. Ronde pour avril—Trio for Women's Voices, Cello and Piano. In the interval, Press Review, News and Time Signal.
POZNAŃ (Poland)
 806 kc/s (335 m.); 1.9 kW. Also relayed on 9,830 kc/s (30.5 m.) from 7.30—9.0 p.m.
 Transmits at intervals from 6.15 a.m.
 6.15 p.m.—Talk on Bolshevism.
 6.25 p.m.—Programme for Soldiers.
 7.0 p.m.—Topical Programme.
 7.15 p.m.—Miscellaneous Items and News.
 7.30 p.m.—Military Band Concert, with Tenor Solos. In the intervals, Theatre Review and Station Notes.
 9.0 p.m.—Time, News, Sports and Police Notes.
 9.15 p.m.—Dance Music from the Café Esplanade.
 10.30 p.m. (approx.).—Close Down.

PRAGUE (Czechoslovakia)
 Stranice. 617 kc/s (487 m.); 5.5 kW. Relayed by Brno, 878 kc/s (342 m.) from 6.35—9.15 p.m.; Bratislava, 1,076 kc/s (279 m.), and Moravská-Ostrava, 1,139 kc/s (263 m.), from 6.15—9.15 p.m.
 Transmits at intervals from 10.15 a.m.
 6.15 p.m.—News Bulletin.
 6.20 p.m.—Brass Band Concert.
 7.0 p.m.—Hungarian National Evening, relayed from Budapest.
 9.0 p.m.—Time, News and Sports Notes.
 9.15 p.m.—News, Theatre Notes and Programme Announcements.
ROME (Italy)
 Ente Italiano Audizioni Radiofoniche (IRO). 680 kc/s (441 m.); 75 kW. Relayed by Naples, 905 kc/s (332 m.), and zRO, 3,750 kc/s (80 m.).
 Transmits at intervals from 7.15 a.m.
 7.0 p.m.—Announcements and Report of the International Institute of Agriculture (in Italian, French, English, German and Spanish).
 7.30 p.m.—Time Signal.
 7.32 p.m.—Medical Talk.
 7.45 p.m. (approx.).—Relay of an Opera from the Royal Theatre or the Teatro San Carlo, Naples. In the intervals: Humorous Talk and Topical Review.
STOCKHOLM (Sweden)
 Radiotjänst (SASA). 689 kc/s (436 m.); 75 kW. Relayed by Boden, 250 kc/s (1,200 m.); Göteborg, 932 kc/s (322 m.); Hörby, 1,166 kc/s (257 m.); Motala, 222.5 kc/s (1,348 m.); Östersund, 389 kc/s (770 m.); Sundsvall, 554 kc/s (542 m.).
 Transmits at intervals from 6.15 a.m.
 7.0 p.m.—Symphony Concert from the Works of Alfvén, relayed from the Concert House, the Composer conducting. Symphony in F Minor, No. 1. A Boat with Flowers, for Baritone and Orchestra. Symphonic Poem, Eu Skärgårds-sågen.
 8.40 p.m.—Old Dance Music relayed from Örebro, 1,265 kc/s (237 m.).
 9.0 p.m.—Modern Dance Music.
 10.0 p.m. (approx.).—Close Down.
STRASBOURG (France)
 Radio-Strasbourg (P.T.T.). 869 kc/s (345 m.); 15 kW.
 Transmits at intervals from 11.0 a.m.
 6.15 p.m.—Instrumental Concert.

7.15 p.m.—News in French and German.
 7.30 p.m.—Gramophone Concert.
 8.30 p.m.—News Bulletin.
 8.35 p.m.—Subscription Concert relayed from the Palais des Fêtes.
 10.30 p.m.—News Bulletin.
 10.35 p.m.—Dance Music.
 12 midnight (approx.).—Close Down.
TOULOUSE (France)
 Radiophonie du Midi. 779 kc/s (385 m.); 8 kW.
 Transmits at intervals from 12.45 p.m.
 7.0 p.m.—Spanish Songs.
 7.15 p.m.—Orchestral Music.
 7.30 p.m.—News and Market Prices.
 7.45 p.m.—Orchestral Selections.
 8.0 p.m.—Song Recital.
 8.25 p.m.—Gramophone Records.
 8.45 p.m.—Recitations.
 8.55 p.m.—Fashion Review.
 9.0 p.m.—Time Signal.
 9.2 p.m.—Waltz Music.
 10.30 p.m.—North African News.
 10.45 p.m.—Vocal, Orchestral and Instrumental Concert.
 11.30 p.m.—Dance Music.
 12 midnight.—News and Close Down.
VIENNA (Austria)
 Radio-Wien. 581 kc/s (517 m.); 20 kW. Relayed by Graz, 851 kc/s (352 m.); Innsbruck, 1,058 kc/s (283 m.); Klagenfurt, 662 kc/s (453.2 m.); Linz, 1,220 kc/s (246 m.); and Salzburg, 1,373 kc/s (218 m.).
 Transmits at intervals from 8.20 a.m.
 6.35 p.m.—Chamber Music.
 7.30 p.m.—Three Shrovetide Plays (Hans Sachs): (a) "The Devil and the Old Woman," (b) "The Travelling Student in Paradise," (c) "The Dead Man," with a Prologue; "Hans Sachs' Poetic Mission" (Goethe).
 8.40 p.m. (approx.).—News Bulletin.
 8.50 p.m. (approx.).—Orchestral Concert.
WARSAW (Poland)
 Polskie Radio. 212 kc/s (1,411 m.); 14 kW.
 Transmits at intervals from 10.40 a.m.
 6.45 p.m.—Talk: Hungarian Music
 7.0 p.m.—Hungarian National Evening, relayed from Budapest.
 8.5 p.m.—Reading.
 8.50 p.m.—Song Recital
 9.20 p.m.—Talk: Impressions of Geneva.
 9.50 p.m.—Weather, Police, Sports Notes and Dance Music.

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LADIES ARE REQUESTED to tune-in to AMERICAN STATIONS on Thursday, February 12th, and every Thursday until May 7th, at approximately 4.45 p.m., and hear views of the foremost Fashions Journals, viz: VOGUE, McCALLS, GOOD HOUSEKEEPING, BUTTERICKS, etc. These Broadcasts will recommend the following for smartest dresses:—POLLY PRIM, OSTEND and LADYE PRIDE Voiles, made from these famous PETER PAN fabrics; all are 40 inches wide and Colours are Guaranteed to sunlight and washing. Designs suitable for all ages. Write to us for samples, which we will gladly send and tell you where you can obtain these fabrics locally.

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PROGRAMMES FOR THURSDAY (February 12)

NOTE: THE HOURS OF TRANSMISSION ARE REDUCED TO GREENWICH MEAN TIME

BARCELONA (Spain)
Radio-Barcelona (EAJ1). 860 kc/s (349 m.); 8 kW.

Transmits at intervals from 8.0 a.m.
6.30 p.m.—Trio Music and News.
7.0 p.m.—Gramophone Records.
8.30 p.m.—Elementary English Lesson.
9.0 p.m.—Chimes, Weather and Exchange Quotations.
9.5 p.m.—Orchestral Concert.
10.0 p.m.—News Bulletin.
10.5 p.m.—"The Sombre Benefactor"
—Italian Comedy in Three Acts (Carlo Goldoni, translated into Catalan by Narciso Oller).
11.30 p.m.—Gramophone Records.
12 midnight (approx.)—Close Down.

BERLIN (Germany)
Königs Wusterhausen. 183 kc/s (1,635 m.); 35 kW.

Transmits at intervals from 5.20 a.m.
3.30 p.m.—See Berlin (Witzleben).
4.30 p.m.—Chamber Music.
5.0 p.m.—Talk: Old German Carnival and Fools' Verse.
5.30 p.m.—Educational Talk: The Theatre and Culture.
6.0 p.m.—Talk: The League of Nations and the World Economic Crisis.
6.30 p.m.—Agricultural Talk.
6.55 p.m.—Weather for Farmers.
7.0 p.m.—Talk: The Evening Programme of Königs Wusterhausen.
7.25 p.m.—Programme from Munich.
9.20 p.m.—Weather, News and Sports Notes, followed by Dance Music from Berlin (Witzleben).
11.30 p.m. (approx.)—Close Down.

BERLIN (Germany)
Witzleben. 716 kc/s (418 m.); 1.7 kW.

Transmits at intervals from 6.0 a.m.
3.30 p.m.—Instrumental Concert.
4.30 p.m.—Talk for Young People: In the Silver Mines.
4.50 p.m.—Talk by Dr. Dargel.
5.15 p.m.—Talk: What we do not yet know about the Future of Mankind.
5.40 p.m.—Concert of Folk Songs.
6.5 p.m.—Talk: The Tax on Earned Income as a Compulsory Savings-Bank.
6.30 p.m.—Labour Market Report.
6.35 p.m.—Concert of Light Music.
7.30 p.m.—"Conversations with Henry Ford"—the History of the Automobile—a Wireless Play (Emil Burri and Elizabeth Hauptmann).
9.0 p.m.—Weather, News and Sports Notes.
9.15 p.m. (approx.)—Dance Music.
11.30 p.m. (approx.)—Close Down.

BERNE (Switzerland)
Radio-Bern. 743 kc/s (403 m.); 1.1 kW.

6.0 p.m.—Elementary English Lesson.
6.28 p.m.—Time and Weather.
6.30 p.m.—Talk by the Author, Rudolf Hermann Döring: Stringberg and Philosophy.
7.0 p.m.—Soloist and Orchestral Concert.
9.0 p.m.—News and Weather.
9.15 p.m.—Late Concert.
9.40 p.m. (approx.)—Close Down.

BRESLAU (Germany)
923 kc/s (325 m.); 1.7 kW. Relayed by Gleiwitz, 1,184 kc/s (253 m.).

Transmits at intervals from 8.5 a.m.
6.0 p.m.—Weather for Farmers, followed by Gramophone Records of Lanner's Waltzes and Selections from the Works of Schumann.
7.0 p.m.—Weather, followed by Talk for Workers: The Problem of Working Hours.
7.30 p.m.—Programme relayed from Berlin (Witzleben).
9.0 p.m.—Time, Weather, News, Sports Notes and Programme Announcements.
9.20 p.m.—Talk arranged by the Silesian Workers' "Week-end" Association.
9.30 p.m.—Dance Music from Berlin (Witzleben).
11.30 p.m. (approx.)—Close Down.

BRUSSELS (Belgium)
Radio-Belgique. 590 kc/s (509 m.); 15 kW.

5.0 p.m.—Orchestral Concert.
6.0 p.m.—Programme for Children.
6.45 p.m.—Le Journal Parlé.
7.0 p.m.—Gramophone Records.
7.15 p.m.—Agricultural Talk.
7.30 p.m.—Gramophone Records.
7.45 p.m.—Le Journal Parlé.
8.0 p.m.—Concert of Italian Music. Overture, "William Tell" (Rossini). Aria from "The Barber of Seville" (Rossini). Selection from "Aida" (Verdi). Selection from "Cavalleria Rusticana" (Mascagni). Aria (Puccini). Selection from "La Bohème" (Puccini).
9.0 p.m.—Talk (to be announced).
9.15 p.m.—Orchestral Concert.
10.0 p.m.—News and Weather.

BRUSSELS No. 2 (Belgium)
887 kc/s (338.2 m.); 12 kW.
Transmits at intervals from 5.0 p.m.
Programme in Flemish.
7.15 p.m.—Talk: The Flemish Language.
7.30 p.m.—Gramophone Records.
7.45 p.m.—Le Journal Parlé.
8.0 p.m.—Concert. In the interval, Talk: Modern Flemish Literature.
10.0 p.m.—Le Journal Parlé.

BUCHAREST (Romania)
Radio-Bucarest. 761 kc/s (394 m.); 16 kW

Transmits at intervals from 11.0 a.m.
6.0 p.m.—Gramophone Records.
6.30 p.m.—English Language Lesson.
7.0 p.m.—Cello Recital.
7.30 p.m.—Talk (to be announced).
7.45 p.m.—Pianoforte Recital.
8.15 p.m.—Violin Solos.
8.45 p.m.—News and Close Down.

BUDAPEST (Hungary)
545 kc/s (550 m.); 23 kW.

Transmits at intervals from 8.15 a.m.
5.45 p.m.—English Language Lesson.
6.15 p.m.—Talk (to be announced).
6.35 p.m.—Humorous Programme.
8.0 p.m.—Orchestral Concert, followed by Concert by a Tzigane Orchestra from the Hotel Metropolitan.

COLOGNE (Germany)
Westdeutscher Rundfunk. 1,319 kc/s (227 m.); 1.7 kW. See Langenberg Programme.

COPENHAGEN (Denmark)
1,067 kc/s (281 m.); 1 kW. Relayed by Kalundborg, 260 kc/s (1,153 m.).

Transmits at intervals from 6.30 a.m.
2.0 p.m.—Instrumental Concert.
2.45 p.m.—(in the interval).—Reading.
4.0 p.m.—Programme for Boys.
4.40 p.m.—Exchange Quotations and Market Prices.
4.50 p.m.—Talk: August Strindberg and Hans Christian Andersen.
5.20 p.m.—English Language Lesson.
5.50 p.m.—Weather and News.
6.15 p.m.—Time Signal.
6.24 p.m.—Report of the Jutland Listeners' Association.
6.30 p.m.—Talk: Young Liberals.
7.0 p.m.—Town Hall Chimes.
7.2 p.m.—"L'Avare"—Comedy in Five Acts (Molière), translated by Th. Overstern.
8.45 p.m.—News Bulletin.
9.0 p.m.—European Transmission—Hungarian National Evening. Overture, "Hunyadi Laszlo" (Erkel). Violin Solo: Hejre Kati (Hubay). Reading. Three Selections (Dohnányi): (a) Hungarian Harvest Festival, (b) Hungarian Children's Scenes, (c) Hungarian Village Scenes. Hungarian Folk Melodies. Hungarian Folk Dances (Béla Bartók).
10.0 p.m.—Dance Music from Nimb's Restaurant.
11.0 p.m. (in the interval).—Town Hall Chimes.
11.30 p.m. (approx.)—Close Down.

CORK (Ireland)
(6CK). 1,337 kc/s (225 m.); 1.5 kW.

1.30 p.m.—Weather Forecast and Gramophone Records.
6.0 p.m.—Exchange, News Bulletin and Gramophone Records.
6.15 p.m.—Programme from Dublin.
CRACOW (Poland)
Polskie Radio. 1,229 kc/s (244 m.); 1.5 kW.
Transmits at intervals from 10.40 a.m.
6.10 p.m.—Agricultural Report.
6.25 p.m.—Gramophone Records.
6.40 p.m.—Radio Journal.
7.0 p.m.—Reading.
7.15 p.m.—Talk from Warsaw.
7.30 p.m.—Violin and Pianoforte Recital from the Works of French Composers.
8.10 p.m. (in an interval).—Literary Programme from Warsaw.
9.0—10.0 p.m.—Programme from Warsaw.
10.0 p.m.—Dance Music Programme.
11.0 p.m. (approx.)—Close Down.

DUBLIN (Ireland)
(2RN). 725 kc/s (413 m.); 1.5 kW.

1.30—2.0 p.m.—Time, Weather, Stock Report and Gramophone Concert.
6.0 p.m.—Gramophone Records.
6.15 p.m.—Programme for Children.
7.0 p.m.—News Bulletin.
7.30 p.m.—Time and French Lesson.
7.45 p.m.—Concert. The Station Sextet in Classical Music: (a) Scherzo (Haydn), (b) Pantemime (Mozart), (c) Minuet (Beethoven), (d)ANCES (Schubert). Nora Finn (Contralto). J. O'Sheehan and Company in a Revue.
9.5 p.m.—Talk on Literature and the Drama.
9.20 p.m.—Programme to be announced.
10.30 p.m.—Sponsored Programme.
10.30 p.m.—Time, News, Weather and Close Down.

FRANKFURT-am-MAIN (Germany)
770 kc/s (390 m.); 1.7 kW. Relayed by Cassel, 1,220 kc/s (246 m.).

Transmits at intervals from 5.15 a.m.
6.15 p.m.—Time, Weather and Economic Notes.
6.20 p.m.—French Language Lesson.
6.45 p.m.—Orchestral Concert of New Film Music.
7.45 p.m.—See Mühlacker Programme.
9.15 p.m.—Time, Weather, News and Sports Notes.
9.35 p.m.—Dance Music from Berlin (Witzleben).
11.30 p.m. (also on Zeesen, 31.38 m.).—Late Concert. Sonata for Cello and Pianoforte in G Minor, Op. 12 (v. Hesse). Trio in C Major for Pianoforte, Violin and Cello, Op. 87 (Brahms).—Close Down.

HAMBURG (Germany)
Norag (ha, in Morse). 806 kc/s (372 m.); 1.7 kW. Relayed by Bremen, 1,112 kc/s (270 m.); Flensburg, 1,373 kc/s (218 m.); Hanover, 530 kc/s (566 m.); and Kiel, 1,292 kc/s (232.2 m.).

Transmits at intervals from 5.20 a.m.
5.10 p.m.—Variety Programme.
6.0 p.m.—Talk: The Year in Folk Sayings and Weather Saws.
6.25 p.m. (from Hanover).—Medical Talk.
6.50 p.m.—Frankfurt Exchange, Hamburg Egg Market Prices and Weather.
7.0 p.m.—"The Tenor"—Comic Opera in Three Acts (Dohnányi), relayed from the Municipal Opera House, Hanover.
9.15 p.m.—News Bulletin.
9.45 p.m. (from Hanover).—An Evening Stroll through Hanover.

HEILSBURG (Germany)
1,085 kc/s (276.5 m.); 75 kW. Relayed by Danzig, 662 kc/s (453 m.).

Transmits at intervals from 5.30 a.m.
3.30 p.m.—Concert of Light Music.
4.45 p.m.—Dr. Reinhard Goring reads from his own Works.
5.10 p.m.—Ice Report and Agricultural Prices.
5.30 p.m.—Talk on Handicrafts.
6.0 p.m. (from Danzig).—French Conversational Lesson.
6.25 p.m.—Weather Report.
6.30 p.m.—Gramophone Concert.
7.30 p.m.—Programme from Berlin (Witzleben).
9.10 p.m. (approx.).—Weather, News, Sports Notes and Silent Night.

HILVERSUM (Holland)
160 kc/s (1,875 m.); 8.5 kW. (transmitted from Huizen).

7.40 a.m.—11.40 p.m.—Programme of the Algemeene Vereeniging Radio Omroep (A.V.R.O.).
7.40 a.m.—Time and Gramophone Records.
9.40 a.m.—Time and Daily Service.
10.10 a.m.—Quintet Concert.
11.40 a.m.—Time Signal.
12.10 p.m.—Orchestral Concert relayed from the Tuschinski Theatre, Amsterdam.
1.40 p.m.—Talk for Women.
2.10—2.40 p.m.—Interval.
2.40 p.m.—Talk (to be announced).
3.40 p.m.—Programme for Hospitals.
4.40 p.m.—Orchestral Concert relayed from the Asta Theatre, The Hague.
6.10 p.m.—Talk (to be announced).
6.40 p.m.—English Language Lesson.
7.40 p.m.—Time Signal.
7.41 p.m.—Talk on Sports.
8.5 p.m.—Orchestral Concert relayed from the Concert Hall, Amsterdam. Symphony (Nabokoff). Concerto in A Minor for Piano (Schumann).
8.55 p.m.—Orchestral Concert. In the interval at 9.40 p.m.—Weather and News.
10.40 p.m.—Gramophone Records.
11.40 p.m. (approx.)—Close Down.

HUIZEN (Holland)
1,004 kc/s (298 m.); 8.5 kW. (Transmitted from Hilversum).

7.40—8.55 a.m.—Programme of the Catholic Radio Society (K.R.O.). Gramophone Records.
9.40—10.40 a.m.—Programme of the Christian Radio Society (N.C.R.V.).
9.40 a.m.—Selections by a Ladies' Choir.
10.10 a.m.—Programme for Hospitals.
11.10 a.m.—1.40 p.m.—Programme of the K.R.O.—Religious Address.
11.40 a.m.—Trio Concert.
1.10 p.m.—Gramophone Records.
1.40—7.40 p.m.—Programme of the N.C.R.V.
1.40 p.m.—Gramophone Records.
1.55 p.m.—Lesson in Handicrafts for Women.
3.40 p.m.—Programme for Hospitals.
4.40 p.m.—Quintet Concert.
6.10 p.m.—Gramophone Records.
6.25 p.m.—Dressmaking Lesson.
6.40 p.m.—Talk by Mr. Heavise.
7.10 p.m.—Gramophone Records.
7.40 p.m. till Close Down.—Programme from the K.R.O.
7.40 p.m.—Opening Address.
7.55 p.m.—Orchestral Concert. March, Vooruit K.R.O. ('t Woud). Overture, "Maritana" (Wallace). Waltz, Wine, Woman and Song (J. Strauss). Songs: (a) Recitative and Aria from "The Creation" (Haydn), (b) De gefoete vogel aar (van Rennes). Overture, "Martha" (Flotow). Barcarolle from "The Tales of Hoffmann" (Offenbach). March, King Cotton (Souza). Songs: (a) Aria from "The Queen of Sheba," (b) The Horn, (c) Song from "The Merry Wives of Windsor" (Nicolai).

9.10 p.m.—News Bulletin.
9.25 p.m.—Gramophone Records.
9.40 p.m.—Concert (contd.). Duets for Soprano and Bass from "The Creation" (Haydn). Overture "Orpheus in the Underworld" (Offenbach). Selection from "A Waltz Dream" (O. Strauss). Petersburger Schlittenfahrt (Eilenberg).
10.25 p.m.—Address and Songs.
10.40 p.m.—Gramophone Records.
11.40 p.m. (approx.)—Close Down.

KALUNDBORG (Denmark)
Kalundborg Radio. 260 kc/s (1,153 m.); 10 kW. See Copenhagen Programme.

KÖNIGSBERG (Germany)
Ostmarken Rundfunk. 1,387 kc/s (216.3 m.); 1.7 kW. See Heilsberg Programme.

LANGENBERG (Germany)
Westdeutscher Rundfunk. 635 kc/s (473 m.); 17 kW. Relayed by Aachen, Cologne and Münster, 1,319 kc/s (227 m.).

Transmits at intervals from 5.45 a.m.
6.0 p.m.—Weather, Time, Economic and Sports Notes.
6.15 p.m.—Topical Talk.
6.25 p.m.—Talk on the Theory and Practice of Economics: Exchange and Industry.
6.45 p.m.—Recital of Songs, with Orchestral Selections. Overture, "The Marriage of Figaro" (Mozart). Recitative and Aria for Soprano from "The Marriage of Figaro" (Mozart). Bass Solos: (a) Aria from "Don Juan" (Mozart), (b) Aria from "Fidelio" (Beethoven). Overture, "Oberon" (Weber). Soprano Solo from "Die drei Pintos" (Weber). Tenor Solo from "Hans Heiling" (Marschner). Ballet Music from "Robert le Diable" (Meyerbeer). Tenor Aria from "L'Africaine" (Meyerbeer). Interlude: "Fastnacht heiss' ich!"—Four Scenes of Yesterday and To-day (Frapck—Music by Gustav Kneip). Soprano Solo from "Der Wildschütz" (Lortzing). Bass Aria from "Der Waffenschmid" (Lortzing). Prelude to the Third Act of "Kunihild" (Kistler). Monologue for Bass from "The Mastersingers" (Wagner). Introduction and Waltz from "Lobetanz" (Thuille). Scene for Soprano from "Die toten Augen" (d'Albert). Polonaise from "Der Fremde" (Kaun). After the Programme: News, Sports and Miscellaneous Announcements, Concert and Dance Music.
11.0 p.m. (approx.)—Close Down.

LEIPZIG (Germany)
Mitteldeutscher Rundfunk. 1,157 kc/s (259 m.); 2.3 kW. Relayed by Dresden, 941 kc/s (319 m.).

Transmits at intervals from 9.0 a.m.

6.0 p.m.—Dialogue: The Welfare Worker, a Friend in Need.

6.30 p.m.—Orchestral Concert—First Performances. Divertissement for Small Orchestra (Max Dehnert). Concerto for Flute, Pianoforte and String Orchestra (Erich Mirsch-Riccius). Serenade, Op. 8 (Jentsch).
7.45 p.m.—"Le malade imaginaire"—Play (Molière), arranged for the Wireless by Paul Prina.
9.15 p.m.—News and Silent Night.

MADRID (Spain)
Union Radio (EAJ7). 707 kc/s (424 m.); 2 kW.

Transmits at intervals from 8.0 a.m.
7.0 p.m.—Chimes, Exchange Quotations, Market Prices and Programme for Children.
7.30 p.m.—Dance Music.
8.5 p.m.—English Lesson by the Linguaphone New Method.
8.25 p.m.—News Bulletin.
8.30—9.30 p.m.—Interval.
9.30 p.m.—Chimes, Time, Exchange Quotations, and Relay from the Teatro del Liceo, Barcelona.
11.55 p.m.—News Bulletin.
12 midnight.—Chimes and Close Down.

MILAN (Italy)
Ente Italiano Audizioni Radiofoniche. 599 kc/s (501 m.); 8.5 kW. Programme relayed by Turin, 1,013 kc/s (296 m.) and Genoa, 958 kc/s (313.2 m.).

Transmits at intervals from 7.15 a.m.
6.20 p.m.—Announcements and Report of the Royal Geographical Society.
6.30 p.m.—Variety Music.
7.15 p.m.—Giornale Radio; Weather.
7.30 p.m.—Time Signal.
7.32 p.m.—Symphony Concert. Overture, "L'épreuve villageoise" (Grétry). Three Selections (Sonzogno). Concerto for Cello and Orchestra (Saint-Saëns). Talk on Art. A Margherita di Savoia—Ode by Goisue Carducci, for Soprano and Orchestra (Toni). Theme and Variations with Fugue for Orchestra (Alceo Toni), conducted by the Composer. Literary Review. Symphonic Poem, En Saga (Sibelius). Selection from "The Bartered Bride" (Smetana).

9.30 p.m.—Comedy Programme.
10.0 p.m.—Giornale Radio, followed by Concert from the Cova Restaurant.
10.55 p.m.—News Bulletin.

MOTALA (Sweden)
222.5 kc/s (1,348 m.); 40 kW. See Stockholm Programme.

MÜHLACKER (Germany)
Sueddeutscher Rundfunk. 833 kc/s (360 m.); 75 kW. Relayed by Freiburg, 527 kc/s (570 m.).

Transmits at intervals from 5.15 a.m.
6.15 p.m.—Time Signal.
6.20 p.m.—Programme from Frankfurt.
7.45 p.m.—"Renaissance, Baroque and Rococo"—Fourth Evening: "The English Renaissance"—a Wireless Work (Paul Enderling). Literary Selections from "The New Atlantis" (Francis Bacon), "The Faerie Queen" (Spenser), "Euphues" (Lily), "A Groat's Worth of Wit bought with a Million of Repentance" (R. Greene), and Extracts from Shakespeare and Thomas Kyd. Contemporary Music and a Short Play: "The Tragic History of Doctor Faustus" (Christopher Marlowe, 1564-1593).
9.30 p.m.—Programme Announcements, News and Weather.
9.45 p.m.—Gramophone Dance Music.
11.0 p.m. (approx.)—Close Down.

MUNICH (Germany)
563 kc/s (533 m.); 1.7 kW. Relayed by Augsburg, 536 kc/s (560 m.); Kaiserslautern, 536 kc/s (560 m.); and Nürnberg, 1,256 kc/s (239 m.).

Transmits at intervals from 5.45 a.m.
6.5 p.m.—A Report on Topical Technical Questions.
6.30 p.m.—Orchestral Concert. Overture, "Die schöne Galathée" (Suppé). Berceuse (Sibelius). Selection from "Il Trovatore" (Verdi). Pastoral Suite (Scassola). Potpourri, Waldteufeleien (Fl. Kling). An den Frühling (Grieg). Cowboyspiele (Döring).
8.5 p.m.—"The Humble Bee"—a Grotesque (Hassc Zetterström).
8.20 p.m.—Orchestral Concert. Eine lustige Spielmusik, for Small Orchestra (Fetsch). Chinese Songs for Soprano and Orchestra (Mau-

Programmes for Thursday—(Cont.)

rice). Suite from "The Fire Bird" (Stravinsky).
9.20 p.m.—Time, Weather, News and Sports Notes.

OSLO (Norway)

Kringkastingselskapet. 280 kc/s (1,071 m.); 75 kW. Relayed by Fredrikstad, 815 kc/s (368 m.); Hamar, 511 kc/s (587 m.); Nottodden, 671 kc/s (447.1 m.); Porsgrund, 662 kc/s (453 m.); and Rykan, 671 kc/s (447.1 m.).
Transmits at intervals from 9.0 a.m.
6.15 p.m.—Weather and News.
6.30 p.m.—German Language Lesson.
7.0 p.m.—Time Signal.
7.2 p.m.—Agricultural Programme.
7.30 p.m.—Programme to be announced.
8.35 p.m.—Weather, News and Topical Talk.
9.5 p.m.—Recitations by Johan Juuhl.

PARIS (France)

Eiffel Tower (FLE). 207 kc/s (1,445 m.); 15 kW.
9.30 a.m.—Time Signal on 113.2 kc/s (2,650 m.).
9.36 a.m.—Time Signal on 113.2 kc/s (2,650 m.).
5.45 p.m.—Le Journal Parlé.
7.10 p.m.—Weather Forecast.
7.20 p.m.—Concert Selections (Liszt): (a) Les Préludes, (b) Concerto in E Flat, (c) Rhapsody No. 2. Selection from "Der Rosenkavalier" (R. Strauss). Le Voyage en Chine (Bazin). Song from "Les Cloches de Corneville" (Planquette). Selection from "Barbe bleue" (Offenbach). Song from "Les Noces de Jeannette" (Masse). Blumenfüstern (von Blon). Quand je danse avec lui (Eblinger). Avoir un bon copain (Heymann). Selection (Baer). Accordion Solos: (a) L'amour de ma mie (Bosc), (b) Néma (Peller), (c) Imitando (Rossi). Sidi Ibrahim (Porret). L'Hartmannsvillerkopf (Courhade).
10.30 p.m.—Time Signal on 113.2 kc/s (2,650 m.).
10.36 p.m.—Time Signal on 113.2 kc/s (2,650 m.).

PARIS (France)

Radio-Paris (CFR). 174 kc/s (1,725 m.); 17 kW.
Transmits at intervals from 6.45 a.m.
12.30 p.m.—Gramophone Concert.

In the intervals at 1.0 p.m.—Exchange Quotations and News, and at 1.30 p.m.—Exchange Quotations.

2.0 p.m.—Exchange Quotations and Market Prices.
3.30 p.m.—Exchange Quotations.
3.45 p.m.—Dance Music.
4.15 p.m.—Programme for Children.
4.55 p.m.—News and Exchange Quotations.
6.0 p.m.—Agricultural Report and Racing Results.
6.25 p.m.—Market Prices.
6.30 p.m.—Gramophone Concert.
7.0 p.m.—Talk: A Great Actor—Le Kain.
7.30 p.m.—Elementary Book-keeping Lesson.
7.45 p.m.—Commercial Prices, Economic and Social Notes and News.
8.0 p.m.—Concert. "L'Abbé Constantin"—Sketch (Halévy). Harp Solos: (a) Theme and Variations (Tournier), (b) Une châteline en sa tour (Fauré), (c) Les follets (Hasselmanns). Songs: (a) Barcarolle (Fauré), (b) Croquis d'orient (Hue). Caprice for Harp and Clarinet (Poentiz). Octet for Two Violins, Viola, Cello, Double-bass, Clarinet, Bassoon and Horn (Schubert). In the intervals at 8.30 p.m.—Sports Review and News, and at 9.15 p.m.—Press Review, News and Time Signal.

PARIS (France)

Poste Parisien. 914 kc/s (329 m.); 1.2 kW.
9.0 a.m.—Transmission of Pictures.
8.25 p.m.—Gramophone Records, Talk and News Bulletin.
9.0 p.m.—Concert. Prelude to "Parsifal" (Wagner). Concerto in F for Bassoon and Orchestra (Weber). Symphonic Poem, Thus spake Zarathustra (Rich. Strauss). Musical Jest, Dorfmusikanten (Mozart). The Tale of Czar Saltana (Rimsky-Korsakoff). Spring Song (Mendelssohn). First Hungarian Dance (Brahms).

POZNAŃ (Poland)

896 kc/s (335 m.); 1.9 kW. Also relayed on 9,830 kc/s (30.5 m.) from 7.30 p.m.—8.30 p.m.
Transmits at intervals from 6.0 a.m.
6.0 p.m.—Humorous Programme.
6.15 p.m.—Agricultural Talk.

6.45 p.m.—Short-Wave Notes.
7.0 p.m.—Elementary English Lesson.
7.15 p.m.—Miscellaneous Items and News.
7.30 p.m.—Organ Recital, followed by Soprano Solos from the Works of Richard Strauss.
8.30 p.m.—Musical Interlude. In the intervals, Theatre Review and Station Notes.
9.0 p.m.—Time, News, Sports and Police Notes.
9.15 p.m.—Concert relayed from Lwów, 788 kc/s (381 m.).
9.35 p.m. (approx.)—Close Down.

PRAGUE (Czechoslovakia)

Stranice. 617 kc/s (487 m.); 5.5 kW. Relayed by Brno, 878 kc/s (342 m.), Bratislava, 1076, kc/s (279 m.), and Moravská-Ostrava, 1,139 kc/s (263 m.), from 9.20 p.m. till Close Down.
Transmits at intervals from 10.15 a.m.
6.20 p.m.—"A Night at Karlstein"—Opera in Three Acts (Novak), relayed from the National Theatre, Brno.
9.0 p.m.—Time, News and Sports Notes.
9.15 p.m.—News, Theatre Notes and Programme Announcements.
9.20 p.m.—Organ Recital from the Beranek Cinema.
10.0 p.m.—Time, News and Chimes.

ROME (Italy)

Ente Italiano Audizioni. Radiofonica (IRO). 680 kc/s (441 m.); 75 kW. Relayed by Naples, 905 kc/s (332 m.); and 2RO, 11,810 kc/s (25.4 m.).
Transmits at intervals from 7.15 a.m.
6.45 p.m.—Giornale Radio, News and Sports Notes.
7.0 p.m.—Announcements and Press Review.
7.30 p.m.—Time Signal.
7.32 p.m.—Announcements.
7.40 p.m.—Hungarian National Evening. Vocal and Orchestral Concert. Symphony, Ländliche Hochzeit, Op. 26 (Goldmark). Talk: Italy and Hungary in History and Art. Popular Hungarian Songs (arr. Béla Bartók). Scenes from the Czardas, No. 4, for Violin and Pianoforte (Hubay). Hungarian Fantasia for Pianoforte and Orchestra (Liszt). Two Tenor Solos from "The Queen of Sheba" (Goldmark). Recitations: Hungarian Poems. Hungarian March

from "The Damnation of Faust" (Berlioz). Hungarian Dance in G Major (Brahms).
9.55 p.m. (approx.)—News.

STOCKHOLM (Sweden)

Radiojäst (SASA). 689 kc/s (436 m.); 75 kW. Relayed by Boden, 250 kc/s (1,200 m.); Göteborg, 932 kc/s (322 m.); Hörby, 1,166 kc/s (257 m.); Motala, 222.5 kc/s (1,348 m.); Östersund, 389 kc/s (770 m.); Sundsvall, 554 kc/s (542 m.).
Transmits at intervals from 6.15 a.m.
6.0 p.m.—Elementary German Lesson, relayed from Göteborg.
6.30 p.m. (from Göteborg).—Talk: How the Sea produces our Food.
7.0 p.m.—Concert relayed from Malmö 1,301 kc/s (231 m.). Sonata, Op. 81, for Piano (Beethoven). Sonata in D Minor for Cello (de Fesch). Pianoforte Solos (Schubert): (a) Der Wanderer, (b) An den Mond, (c) Der Neugierige, (d) Zuleika, (e) Die Forelle. Cello Solos: (a) Elégie (Fauré), (b) Sicilienne (Fauré), (c) Chant élégiaque (Florent Schmitt), (d) Spanish Dance (Granados).
8.0 p.m.—Introductory Talk to the following Transmission.
8.40 p.m.—"Woyzek"—Play (Büchner).
9.50 p.m. (approx.)—Close Down.

STRASBOURG (France)

Radio-Strasbourg (P.T.T.). 869 kc/s (345 m.); 15 kW.
Transmits at intervals from 11.0 a.m.
6.15 p.m.—Gramophone Concert.
7.15 p.m.—News in French and German.
7.30 p.m.—Instrumental Concert.
8.30 p.m.—News Bulletin.
8.35 p.m.—Concert relayed alternately from the Café de la Paix and from the Odeon.
10.30 p.m. (approx.)—Close Down.

TOULOUSE (France)

Radiophonie du Midi. 779 kc/s (385 m.); 8 kW.
Transmits at intervals from 12.45 p.m.
6.0 p.m.—Transmission of Pictures.
6.15 p.m.—Exchange Quotations.
6.30 p.m.—Dance Music Programme.
6.45 p.m.—Market Prices.
6.55 p.m.—Gramophone Records.
7.30 p.m.—News and Market Prices.
7.45 p.m.—Gramophone Records.
8.55 p.m.—Fashion Review.
9.0 p.m.—Time Signal.
9.2 p.m.—Concert. Selections from

"Romeo and Juliet" (Gounod); "Manon" (Massenet); "Mireille" (Gounod); "Carmen" (Bizet); "I Pagliacci" (Leoncavallo); "The Daughter of the Regiment" (Donizetti); "Rigoletto" (Verdi); "La Bohème" (Puccini); "Resurrectione" (Alfano); and "Romeo and Juliet" (Gounod).

10.0 p.m.—Military Music.
10.15 p.m.—Musical Programme.
10.30 p.m.—North African News.
10.45 p.m.—Symphony Music.
11.15 p.m.—Cello Recital.
11.30 p.m.—Dance Music Programme.
12 midnight.—News and Close Down.

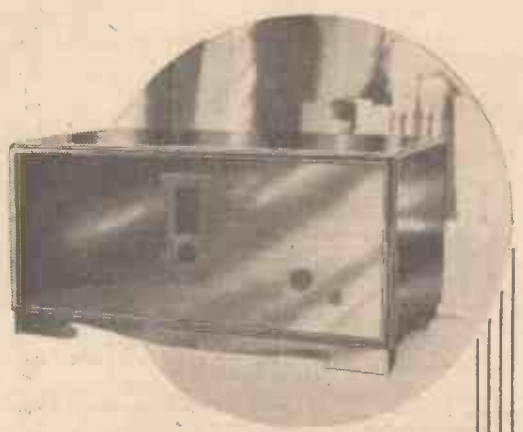
VIENNA (Austria)

Radio-Wien. 581 kc/s (517 m.); 20 kW. Relayed by Graz, 851 kc/s (352 m.); Innsbruck, 1,058 kc/s (283 m.); Klagenfurt, 662 kc/s (453 m.); Linz, 1,220 kc/s (246 m.); and Salzburg, 1,373 kc/s (218 m.).
Transmits at intervals from 8.20 a.m.
6.0 p.m.—French Language Lesson.
6.30 p.m.—Talk: Great German and Austrian Discoveries in Modern Physics.
7.0 p.m.—Time, Weather, Alpine Weather Report and Programme Announcements.
7.5 p.m.—"Die Teresina"—Operetta in Three Acts (O. Straus). News in an interval.
9.40 p.m. (approx.)—Dance Music.

WARSAW (Poland)

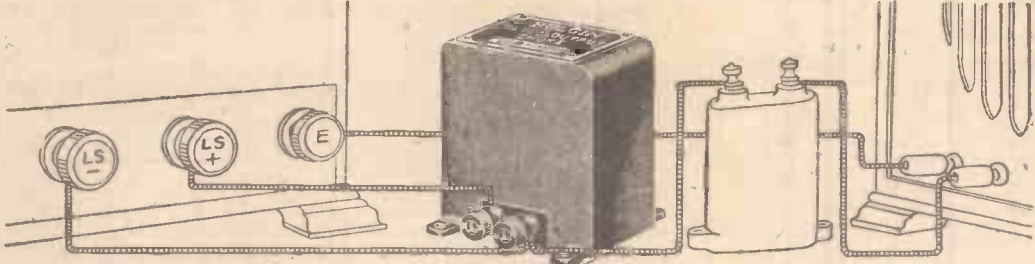
Polskie Radio. 212 kc/s (1,411 m.); 14 kW.
Transmits at intervals from 10.40 a.m.
6.10 p.m.—Agricultural Report.
6.25 p.m.—Gramophone Records.
6.35 p.m.—Programme Announcements.
6.40 p.m.—Radio Journal.
6.55 p.m.—Gramophone Records.
7.0 p.m.—Programme from Cracow.
7.15 p.m.—Wireless Technical Talk.
7.30 p.m.—Vocal and Orchestral Concert. In the interval, Theatre Review.
8.10 p.m.—Literary Programme.
8.25 p.m.—Concert (continued).
9.0 p.m.—Reading: "The Story of an Officer."
9.15 p.m.—Programme relayed from Lwów 788 kc/s (381 m.).
9.50 p.m.—Weather, Police and Sports Notes.
10.0 p.m.—Dance Music Programme.
11.0 p.m. (approx.)—Close Down.

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E. V. R.

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PROGRAMMES FOR FRIDAY (February 13)

NOTE: THE HOURS OF TRANSMISSION ARE REDUCED TO GREENWICH MEAN TIME

ALGIERS (N. Africa)

825.3 kc/s (363.4 m.); 13 kW.
Transmits at intervals from 12.30 p.m.
7.30 p.m.—News Bulletin.
7.45 p.m.—Songs from Operas.
8.0 p.m.—Concert from the Works of Gabriel Fauré.
9.0 p.m.—Orchestral Concert.
10.0 p.m.—Accordion Solos.
10.15 p.m.—Gramophone Records.

BARCELONA (Spain)

Radio-Barcelona (EAJ1). 850 kc/s (349 m.); 8 kW.
Transmits at intervals from 8.0 a.m.
6.0 p.m.—Programme for Women.
6.30 p.m.—Trio Music and News.
7.0 p.m.—Gramophone Records.
8.30 p.m.—Elementary French Lesson.
9.0 p.m.—Chimes, Weather and Exchange Quotations.
9.5 p.m.—Orchestral Concert.
10.0 p.m.—News Bulletin.
10.5 p.m.—Talk in Catalan: The History of Dress.
10.20 p.m.—Orchestral Concert from the Café Español.
12 midnight (approx.)—Close Down.

BERLIN (Germany)

Königs Wusterhausen. 183 kc/s (1,635 m.); 35 kW.
Transmits at intervals from 5.20 a.m.
3.30 p.m.—Programme from Leipzig.
4.30 p.m.—Carl Meissner reads his own Poems.
5.0 p.m.—Talk on Economics: Forests and Timber in Economic Life.
5.30 p.m.—Educational Talk: The Theatre and Culture.
6.0 p.m.—Advanced English Lesson.
6.30 p.m.—Talk for Dental Surgeons.
6.55 p.m.—Weather for Farmers.
7.0 p.m.—Talk: The Poet Alfons Paquet.
7.30 p.m.—Programme from Breslau.
9.20 p.m.—News and Concert from Berlin (Witzleben).

BERLIN (Germany)

Witzleben. 716 kc/s (418 m.); 1.7 kW.
Transmits at intervals from 6.0 a.m.
6.10 p.m.—Talk on the following transmission.
6.30 p.m.—Concert from the Works of Wagner (died February 13, 1883). Prelude to "Tristan and Isolde." Selection from "The Flying Dutchman." Selection from "The Rhinegold." Winter Storms, from "The Valkyrie." Flower Maidens' Scene from "Parsifal." Wotan's Farewell and Fire Magic from "The Valkyrie." Walter's Prize Song from "The Mastersingers." Apprentices' Scene and Monologue from "The Mastersingers." Selection from "Parsifal." Selections from "The Mastersingers."
8.0 p.m.—News; Sports Notes.
8.10 p.m.—Variety Programme.
9.20 p.m.—Weather, News and Sports Notes.
9.35 p.m.—Concert of Ballet Music.

BERNE (Switzerland)

Radio-Berne. 743 kc/s (403 m.); 1.1 kW.
Transmits at intervals from 11.27 a.m.
6.0 p.m.—Topical Talk.
6.15 p.m.—Sunday Sports Announcements.
6.20 p.m.—Winter Sports Notes.
6.24 p.m.—Road Report by the Swiss Automobile Club.
6.28 p.m.—Time and Weather.
6.30 p.m.—Talk by the author, Rudolf Hermann Döring: Strindberg and Women.
7.0 p.m.—Violin, Cello and Pianoforte Recital.
7.30 p.m.—"Viennese Gaiety"—a Variety Programme. Tenor Solos and Orchestral Selections, with Viennese Sketches in the intervals.
9.0 p.m.—News and Weather.
9.15 p.m.—Weather Report.
9.20 p.m.—Programme announcements in Esperanto.
9.25 p.m. (approx.)—Close Down.

BRESLAU (Germany)

923 kc/s (325 m.); 1.7 kW. Relayed by Gleiwitz, 1,184 kc/s (253 m.).
Transmits at intervals from 10.15 a.m.
5.30 p.m.—Weather for Farmers, followed by Orchestral Concert. Selection from "Werther" (Massenet). Selection from "Maria d'Avalos" (Signorelli). Song (Capri). Andalusian Dance (Delmas). Miniature Suite (Coates). Spanish Dance No. 8 (Sarasate).

6.30 p.m.—Weather, followed by Talk: Champions of the World of Women.
7.0 p.m.—Topical Talk.
7.30 p.m.—"The Silesian Homeland"—Literary and Musical Programme—"From my Diary" (Carl Hauptmann; Music by Strecke), with Introductory Talk.
8.20 p.m.—Concert by the Silesian Philharmonic Orchestra. Symphony in C Major (Beethoven). Concerto in E Flat Major, Op. 11, for French Horn and Clarinet (R. Strauss).
9.20 p.m.—Time, Weather, News, Sports Notes and Programme Announcements.
9.35 p.m.—Partita (Paul Pisk) with Introductory Talk.
10.10 p.m.—Weekly Sound Film Review from the Ufa Theatre.
10.20 p.m. (approx.)—Close Down.

BRUSSELS (Belgium)

Radio-Belgique. 590 kc/s (509 m.); 15 kW.
5.0 p.m.—Chamber Music.
6.0 p.m.—Concert. Selection from "Le Cid" (Massenet). Si mes vers avaient des ailes (Hahn). Méditation (Lauweryns). Ouvre tes yeux bleus, ma mignonne (Massenet). Ballet Music from "La petite Bohème" (Hirschmann). Talk. Scandinavian Impressions (Frederiksen). Selection from "Ghismonda" (Février).
6.45 p.m.—Le Journal Parlé.
7.0 p.m.—Gramophone Records.
7.15 p.m.—Talk: The Anniversary of the Congo Flight by the Belgian Aviator, Edmond Thieffry.
7.30 p.m.—Gramophone Records.
7.45 p.m.—Le Journal Parlé.
8.0 p.m.—Septet (Beethoven), followed by Songs.
8.45 p.m.—Talk (to be announced).
9.0 p.m.—Concert given by the African Conservatoire at Brussels.
9.15 p.m.—Song Recital.
9.30 p.m.—Dance Music Programme.
10.0 p.m.—News and Weather.

BRUSSELS No. 2 (Belgium)

887 kc/s (338.2 m.); 12 kW.
Transmits at intervals from 5.0 p.m.
Programme in Flemish.
7.0 p.m.—Gramophone Records.
7.15 p.m.—Talk: Chinese Civilisation.
7.30 p.m.—Gramophone Records.
7.45 p.m.—Le Journal Parlé.
8.0 p.m.—Vocal and Orchestral Concert. In the interval, Talk.
10.0 p.m.—Le Journal Parlé.

BUCHAREST (Romania)

Radio-Bucarest. 761 kc/s (394 m.); 16 kW.
Transmits at intervals from 11.0 a.m.
6.0 p.m.—Dramatic Programme.
6.30 p.m.—Gramophone Records.
7.0 p.m.—Gramophone Records: "The Barber of Seville"—Opera in Three Acts (Rossini)—Opera in the intervals, News.

BUDAPEST (Hungary)

545 kc/s (550 m.); 23 kW.
Transmits at intervals from 8.15 a.m.
5.40 p.m.—Concert of Tzigane Music.
6.40 p.m.—Talk in German.
7.15 p.m.—Programme from Warsaw, followed by Dance Music from the Café Ostende.

COLOGNE (Germany)

Westdeutscher Rundfunk. 1,319 kc/s (227 m.); 1.7 kW.
See Langenberg Programme.

COPENHAGEN (Denmark)

1,067 kc/s (281 m.); 1 kW. Relayed by Kalundborg, 260 kc/s (1,153 m.).
Transmits at intervals from 6.30 a.m.
2.0 p.m.—Instrumental Concert.
2.45 p.m. (in the interval)—Recital of Songs.
4.0 p.m.—Programme for Children.
4.40 p.m.—Exchange Quotations and Fish Market Prices.
4.50 p.m.—Talk: Biblical Customs in Modern Times—Palestine.
5.20 p.m.—German Language Lesson.
5.50 p.m.—Weather and News.
6.15 p.m.—Time Signal.
6.30 p.m.—Programme by Per Knutzon.
6.40 p.m.—Recital of Danish Romances from the Works of Weyse.
7.0 p.m.—Town Hall Chimes.
7.2 p.m.—Recital of Modern French Cello Music. Sonata for Cello and Pianoforte in D Minor (Debussy). Papillons (Fauré).
7.15 p.m.—Relay from Grundtvig's Hus of a Meeting of the Students' Circle. Subject: The Position of Ecclesiastical Politics. Introductory Talks, followed by Discussion.
10.0 p.m.—News and Close Down.

CORK (Ireland)

(6CK). 1,337 kc/s (225 m.); 1.5 kW.
1.30 p.m.—Weather Forecast and Gramophone Records.
6.0 p.m.—Exchange, News Bulletin and Gramophone Records.
6.15 p.m.—Programme from Dublin.

CRACOW (Poland)

Polskie Radio. 1,229 kc/s (244 m.); 1.5 kW.
Transmits at intervals from 10.40 a.m.
6.10 p.m.—Agricultural Report.
6.40 p.m.—Radio Journal.
7.0 p.m.—Programme from Warsaw, followed by Relay of Foreign Stations.
11.0 p.m.—Bugle Call from the Tower of St. Mary's Church.

DUBLIN (Ireland)

(2RN). 725 kc/s (413 m.); 1.5 kW.
1.30—2.0 p.m.—Time, Weather, Stock Report and Gramophone Concert.
6.0 p.m.—Gramophone Records.
6.15 p.m.—Programme for Children.
7.0 p.m.—Gramophone Records.
7.20 p.m.—News Bulletin.
7.30 p.m.—Time and Gardening Talk.
7.45 p.m.—Programme to be announced.
8.0 p.m.—2RN Symphony Concert.
10.30 p.m.—Time, News, Weather and Close Down.

FRANKFURT-am-MAIN (Germany)

770 kc/s (390 m.); 1.7 kW. Relayed by Cassel, 1,220 kc/s (246 m.).
Transmits at intervals from 5.15 a.m.
6.15 p.m.—Time, Weather, News and Sports Notes.
6.20—11.0 p.m.—See Mühlbacher Programme.
8.45 p.m. (in an interval)—Time, Weather, News and Sports Notes.
11.0 p.m. (approx.)—Close Down.

HAMBURG (Germany)

Norag (ha, in Morse). 806 kc/s (372 m.); 1.7 kW. Relayed by Bremen, 1,112 kc/s (270 m.); Flensburg, 1,373 kc/s (218 m.); Hanover, 530 kc/s (566 m.); and Kiel, 1,292 kc/s (232.2 m.).
Transmits at intervals from 5.20 a.m.
6.0 p.m.—See Königs Wusterhausen.
6.25 p.m.—Talk: A Tour of the East, by German Gymnasts.
6.50 p.m.—Frankfurt Exchange and Hamburg Market Prices.
6.55 p.m.—Weather Report.
7.0 p.m.—"Reeperbahn"—a Tour of Dockland in a Big Port—interviews and Encounters; followed by "The Shooting at St. Pauli" a Wireless Crime Play (Dr. Max Maass).
9.0 p.m.—News Bulletin.
9.30 p.m.—Sea Shanties from Every Port—Orchestral and Vocal Concert.

HEILSBURG (Germany)

1,085 kc/s (276.5 m.); 75 kW. Relayed by Danzig, 662 kc/s (453 m.).
Transmits at intervals from 5.30 a.m.
4.0 p.m.—Concert of Light Music.
4.45 p.m.—Talk for Women: What they eat and drink in Mexico.
5.10 p.m.—Ice Report and Market Prices.
5.30 p.m.—Agricultural Talk.
6.0 p.m.—Review of Books.
6.25 p.m.—Report of the Königsberg Labour Bureau and Weather.
6.30 p.m.—Concert of Light Music.
7.0 p.m.—Concert by the Upper Silesian Wireless Quartet.
7.35 p.m.—Light Music (contd.).
8.10 p.m.—Orchestral Concert from the Works of Wagner. Overture, "Rienzi." Prayer for "Rienzi." Prelude to the Third Act and Dance of the Apprentices from "The Mastersingers." Prize Song from "The Mastersingers." Bacchanal from "Tannhäuser." The Rome Narrative from "Tannhäuser." Entry of the Gods into Valhalla, from "The Rhinegold."
9.20 p.m.—Weather, News and Sports Notes, followed by Topical Sound News from the Alhambra Theatre, Königsberg.

HILVERSUM (Holland)

160 kc/s (1,875 m.); 8.5 kW. (transmitted from Huizen).
7.40—9.40 a.m.—Programme of the Workers' Radio Society (V.A.R.A.).
9.40 a.m.—Gramophone Records.
9.40 a.m.—Divine Service (arranged by the Liberal Protestant Radio Society).
9.55 a.m.—Recitations.
10.10 a.m.—Programme for Hospitals.
11.10 a.m.—Gramophone Records.
11.40 a.m.—3.40 p.m.—Programme

of the Algemeene Vereeniging Radio Omroep (A.V.R.O.).
11.40 a.m.—Time Signal.
12.10 p.m.—Orchestral Concert.
2.10 p.m.—Programme for Schools.
2.40 p.m.—Quintet Concert.
3.40—7.40 p.m. (approx.)—Programme of the V.A.R.A.
3.40 p.m.—Organ Recital.
4.10 p.m.—Programme for Children.
4.55 p.m.—Orchestral Concert conducted by Hugo de Groot.
6.35 p.m.—News Bulletin.
6.50 p.m.—Talk by Mr. Vlieggen.
7.10 p.m.—Police Notes.
7.25 p.m.—Gramophone Records.
7.40—10.40 p.m.—Programme of the Liberal Protestant Radio Society (V.P.R.O.).
7.40 p.m.—Talk: Mediæval Culture.
8.10 p.m.—Gramophone Concert of Old English Music. In the intervals, Reading, News and Talk.
10.40 p.m.—Programme of the V.A.R.A. Gramophone Records.

HUIZEN (Holland)

1,004 kc/s (298 m.); 8.5 kW. (transmitted from Hiltersum).
7.40 a.m. till Close Down.—Programme of the Catholic Radio Society (K.R.O.).
7.40—8.55 a.m.—Gramophone Records.
11.10 a.m.—Programme for Hospitals.
11.40 a.m.—Quintet Concert.
1.10 p.m.—Gramophone Records.
1.40 p.m.—Talk by Mlle. Lauwers.
2.40 p.m.—Band Concert.
3.55 p.m.—Gramophone Records.
4.25 p.m.—Band Concert (contd.).
5.25 p.m.—Talk by Mr. Gerisch.
5.40 p.m.—Gramophone Records.
6.25 p.m.—English Language Lesson.
6.55 p.m.—Talk by Mr. Schilthuis.
7.25 p.m.—Talk by Dr. Angelino.
7.55 p.m.—Orchestral Concert from Groningen. Overture, "Raymond" (Thomas). Waltz, Tales from the Vienna Woods (Strauss). Soprano Solos: (a) Aria from "Etienne Marcel" (Saint-Saëns). (b) Aria from "Hérodiade" (Massenet). (c) Song from "The Fair at Sorochinsk" (Moussorgsky). March, Vooruit, K.R.O. (van 't Woud). Intermezzo from "Cavalleria rusticana" (Mascagni). Overture, "Poet and Peasant" (Suppé). Contralto Solos: (a) Aria from "Alceste" (Gluck). (b) Aria from "The Prophet" (Meyerbeer). (c) Aria from "Carmen" (Bizet).

KALUNDBORG (Denmark)

Kalundborg Radio. 260 kc/s (1,153 m.); 10 kW.
See Copenhagen Programme.
KATOWICE (Poland)
Polskie Radio. 734 kc/s (408 m.); 16 kW.
Transmits at intervals from 10.40 a.m.
6.0 p.m.—Miscellaneous News, Programme Announcements, Theatre Review and Amusement Guide.
6.15 p.m.—Talk, News and Sports Notes.
7.0 p.m.—Talk on Music.
7.15 p.m.—Symphony Concert relayed from the Philharmonic Hall, followed by Weather, Programme Announcements in French and Musical Selections.
10.0 p.m.—Answers in French to Correspondents.
KÖNIGSBERG (Germany)
Ostmarken Rundfunk. 1,387 kc/s (216.3 m.); 1.7 kW.
See Heilsberg Programme.
LAHTI (Finland)
167 kc/s (1,796 m.); 54 kW.
Transmits at intervals from 10.0 a.m.
Programme in Swedish.
6.5 p.m.—Concert of Chamber Music from Helsingfors, 1,355 kc/s (221 m.).
7.45 p.m.—News in Finnish and Swedish and Close Down.
LANGENBERG (Germany)
Westdeutscher Rundfunk. 635 kc/s (473 m.); 17 kW. Relayed by Aachen, Cologne and Münster, 1,319 kc/s (227 m.).
Transmits at intervals from 5.45 a.m.
6.0 p.m.—Weather, Time, Economic and Sports Notes.
6.15 p.m.—Topical Talk.

6.25 p.m.—Talk: International Trade Areas—Central and Further Asia.
6.40 p.m.—Concert of Light Music. March, Klar zum Gefecht (Blankenburgh). Waltz, Mein Lebenslauf ist Lieb und Lust (Strauss). Overture, "Der Waffenschmidt" (Lortzing). Two Alsatian Peasant Dances (Merkling). Character Piece, Schneewittchens Hochzeitstraum (Plessow). Intermezzo, Die alte Spieluhr (Humphries). Selection from "Lilac Time" (Schubert-Berte).
7.30 p.m.—Programme on the occasion of the 150th Anniversary of the Birth of Lessing. "Minna von Barnhelm"—Comedy in Five Acts (Gotthold Ephraim Lessing); followed by News, Sports and Miscellaneous Notes, Concert and Dance Music.
11.0 p.m. (approx.)—Close Down.

LEIPZIG (Germany)

Mitteldeutscher Rundfunk. 1,157 kc/s (259 m.); 2.3 kW. Relayed by Dresden, 941 kc/s (319 m.).
Transmits at intervals from 9.0 a.m.
3.30 p.m.—Concert of Light Classical Symphony Music. Overture in D Major, Op. 43 (Hocherlin). Suite, Les Indes galantes (Rameau). Symphony in C Major, No. 60, Il distratto (Haydn). Ballet Music (Détray).
4.30 p.m.—Weather and Time.
4.55 p.m.—Economic Notes.
5.0 p.m.—Talk on Social Insurance.
5.20 p.m.—English Language Lesson.
5.50 p.m.—We Give Information.
6.0 p.m.—Talk: The Newspaper Reader.
6.30 p.m.—Talk: Famous Wagner Singers.
6.45 p.m.—Concert from the Works of Wagner on the 48th Anniversary of his Death. Prelude, "Lohengrin." Selection from "Tannhäuser." Introduction to the Third Act of "The Mastersingers." Hans Sachs' Monologue from "The Mastersingers." Prelude, "Parsifal." Funerary March from "The Twilight of the Gods." Wotan's Farewell and Fire Magic from "The Valkyrie."
8.0 p.m.—Talk on Topical Economic Questions.
8.10 p.m.—Poets. Interpret their Period—A Radio Sequence from the Works of Goethe, Jean Paul, Arndt and Immanuel.
8.50 p.m.—The Acoustic Visitors' Book of the Mirag.
9.20 p.m.—News. Snow Report and Concert of Light Music.
10.30 p.m. (approx.)—Close Down.

MADRID (Spain)

Union Radio (EAJ7). 707 kc/s (424 m.); 2 kW.
Transmits at intervals from 8.0 a.m.
7.0 p.m.—Chimes, Exchange Quotations, Market Prices and Theatre Review.
7.30 p.m.—Dance Music.
8.10 p.m.—Educational Talk.
8.25 p.m.—News Bulletin.
8.30—9.15 p.m.—Interval.
9.15 p.m.—Lesson in English Pronunciation.
9.30 p.m.—Chimes, Time, Exchange Quotations and Gramophone Records of Symphony Music.
11.55 p.m.—News Bulletin.
12 midnight.—Chimes and Close Down.

MILAN (Italy)

Ente Italiano Audizioni Radiofoniche. 590 kc/s (509 m.); 8.5 kW. Programme relayed by Turin, 1,013 kc/s (296 m.), and Genoa, 958 kc/s (313.2 m.).
Transmits at intervals from 7.15 a.m.
6.20 p.m.—Announcements.
6.30 p.m.—Variety Concert.
7.15 p.m.—Giornale Radio; Weather.
7.30 p.m.—Time Signal.
7.52 p.m.—Musical Selections.
7.52 p.m.—Scientific Notes.
8.0 p.m.—Variety Programme.
8.30 p.m.—Soloist and Orchestral Concert. Selection from "Norma" (Bellini). Tenor Solo and Intermezzo from "Manon Lescaut" (Puccini). Soprano Solo from "Aida" (Verdi). Dances from "Le Roi de Lahore" (Massenet). Talk: From Near and Far. Overture, "Il Guarany" (Gomez). Soprano and Tenor Solos and Duet from "André Chénier" (Giordano). Selection from "La cenerentola" (Rossini).
10.0 p.m.—Giornale Radio, followed by Concert from the Cova Restaurant.
10.55 p.m.—News Bulletin.

MOTALA (Sweden)

222.5 kc/s (1,348 m.); 40 kW. See Stockholm Programme.

Programmes for Friday—(Cont.)

MÜHLACKER (Germany)
Süddeutscher Rundfunk. 833 kc/s (360 m.); 75 kW. Relayed by Freiburg, 527 kc/s (570 m.). Transmits at intervals from 5.15 a.m. to 11.0 p.m.—Time, and Review of the Principal Events of the Coming Week in Esperanto.
6.15 p.m. (from Mannheim).—Medical Talk: Hunger and Thirst.
6.45 p.m.—Three One-Act Plays (W. Lichtenberg): (a) "The Epilogue," (b) "The Punctual Woman," (c) "Dress Worries."
7.15 p.m.—"The Fair Maid of Perth"—Opera after Walter Scott's Novel (Bizet).
8.45 p.m.—Programme Announcements, News, Weather and Sports Notes.
9.10 p.m.—Concert from the Café Schanz, Freiburg.
11.0 p.m. (approx.).—Close Down.

MUNICH (Germany)
563 kc/s (533 m.); 1.7 kW. Relayed by Augsburg, 536 kc/s (560 m.); Kaiserslautern, 536 kc/s (560 m.); and Nürnberg, 1,256 kc/s (239 m.). Transmits at intervals from 5.45 a.m. to 11.0 p.m.—Talk for Women: How to guard against tiring of your Work.
6.30 p.m.—Introductory Talk to the following transmission.
7.35 p.m.—"Sicilian Vespers"—Opera in Five Acts (Verdi), relayed from the Municipal Theatre, Augsburg. In the interval at 8.0 p.m. (approx.).—What is there to see in Augsburg?—A Relay from Augsburg. After the Opera, Time, Weather, News, Sports Notes and Snow Report.

OSLO (Norway)
Kringkastingselskapet. 280 kc/s (1,071 m.); 75 kW. Relayed by Fredrikstad, 815 kc/s (368 m.); Hamar, 511 kc/s (587 m.); Notodden, 671 kc/s (447.1 m.); Porsgrund, 662 kc/s (453 m.); and Rjukan, 671 kc/s (447.1 m.). Transmits at intervals from 9.0 a.m. to 6.15 p.m.—Weather and News.
6.30 p.m.—Stories from Norwegian History.
7.0 p.m.—Time Signal.
7.2 p.m.—Symphony Concert by the Philharmonic Orchestra.

8.35 p.m.—Weather, News and Topical Talk.
9.5 p.m.—Programme (to be announced) relayed from Stavanger, 1,247 kc/s (240.6 m.).

PARIS (France)
Eiffel Tower (FLE). 207 kc/s (1,445 m.); 15 kW.
9.30 a.m.—Time Signal on 113.2 kc/s (2,650 m.).
9.36 a.m.—Time Signal on 113.2 kc/s (2,650 m.).
5.45 p.m.—Le Journal Parlé.
7.10 p.m.—Weather Forecast.
7.20 p.m.—Concert conducted by M. Edouard Flament. Symphony in D (Ph. E. Bach). Violin Solo. Selection from "Javotte" (Saint-Saëns). Le coeur de ma mie (Dalcroze-Chapelier). Masques et Bergamasques (Fauré). Waltz, Acclamations (Waldteufel).
8.30 p.m.—Variety Programme.
10.30 p.m.—Time Signal on 113.2 kc/s (2,650 m.).
10.36 p.m.—Time Signal on 113.2 kc/s (2,650 m.).

PARIS (France)
Poste Parisien. 914 kc/s (329 m.); 1.2 kW.
9.0 a.m.—Transmission of Pictures.
7.25 p.m.—Gramophone Records and News Bulletin.
8.0 p.m.—Concert of Dance Music.
9.15 p.m.—Concert of French Songs.
10.30 p.m. (approx.).—Close Down.

PARIS (France)
Radio-Paris (CFR). 174 kc/s (1,725 m.); 17 kW.
Transmits at intervals from 6.45 a.m. to 12.30 p.m.—Gramophone Concert from the Works of Wagner. In the intervals at 1.0 p.m.—Exchange quotations and News, and at 1.30 p.m.—Exchange Quotations.
2.0 p.m.—Exchange; Market Prices.
3.30 p.m.—Exchange Quotations, 3.45 p.m.—Gramophone Concert.
4.30 p.m.—Talk: Great Musical Epochs.
4.55 p.m.—News and Exchange Quotations.
6.0 p.m.—Agricultural Report and Racing Results.
6.25 p.m.—Market Prices.
6.30 p.m.—Gramophone Concert.
7.0 p.m.—Talk: French Equatorial Africa at the Colonial Exhibition.
7.30 p.m.—Elementary English Lesson.

7.45 p.m.—Commercial Prices, Economic and Social Notes and News.
8.0 p.m.—Talk with Gramophone Illustrations: Meyerbeer.
8.30 p.m.—Sports Review.
8.45 p.m.—Concert. Concerto for Violin and Orchestra (Saint-Saëns). Songs: (a) Ständchen (Schubert), (b) Nuages (Georges), (c) La Caravane (Chausson). Symphonic Variations for Cello and Orchestra (Boëllmann). The Military Symphony (Haydn). In the interval at 9.15 p.m.—Press Review, News and Time Signal.

POZNAN (Poland)
896 kc/s (335 m.); 1.9 kW.
Transmits at intervals from 6.15 a.m. to 11.15 p.m.—Talk on Literature and Poetry.
6.30 p.m.—Advanced English Lesson.
6.45 p.m.—History Talk.
7.0 p.m.—Miscellaneous Items and News.
7.15 p.m.—Symphony Concert from the Works of Beethoven. In the intervals, Theatre Review and Station Notes.
9.30 p.m.—Time, News, Sports and Police Notes.
9.45 p.m.—Dance Music from the Café Polonia.
11.0 p.m. (approx.).—Close Down.

PRAGUE (Czechoslovakia)
Strasnice. 617 kc/s (487 m.); 5.5 kW. Relayed by Brno, 878 kc/s (342 m.), Bratislava, 1,076 kc/s (279 m.) and Moravská-Ostrava, 1,139 kc/s (263 m.), from 7.0—9.15 p.m.
Transmits at intervals from 10.15 a.m. to 6.20 p.m.—Concert by Swedish Musicians.
6.35 p.m.—Recital of English and American Songs.
7.0 p.m.—Dramatic Programme.
9.0 p.m.—Time, News and Sports Notes.
9.15 p.m.—News, Theatre Notes and Programme Announcements.
9.20 p.m.—Concert of Contemporary Music from Brno.

ROME (Italy)
Ente Italiano Audizioni Radiofoniche (IRO). 680 kc/s (441 m.); 75 kW. Relayed by Naples, 905 kc/s (332 m.), and ZRO, 11,810 kc/s (25.4 m.).
Transmits at intervals from 7.15 a.m. to 6.45 p.m.—Giornale Radio, News and Sports Notes.

7.0 p.m.—Announcements and Press Review.
7.30 p.m.—Time Signal.
7.40 p.m.—Announcements.
8.0 p.m.—Variety Programme.
8.35 p.m.—Symphony Concert from the Works of Respighi, conducted by the Composer. Second Suite, Antiche danze ed arie. Toccata for Pianoforte and Orchestra, with the Composer at the Pianoforte. Talk on Literature and Art. Duet, Nocturne, Dance and Final Scene from "Semiramis." Announcements. Symphonic Poem in Four Parts, Feste romane.
9.55 p.m. (approx.).—News.

STOCKHOLM (Sweden)
Radiotjänst (SASA). 689 kc/s (436 m.); 75 kW. Relayed by Boden, 250 kc/s (1,200 m.); Göteborg, 932 kc/s (322 m.); Hörby, 1,166 kc/s (257 m.); Motala, 222.5 kc/s (1,348 m.); Östersund, 389 kc/s (770 m.); Sundsvall, 554 kc/s (542 m.).
Transmits at intervals from 6.15 a.m. to 6.0 p.m.—Talk: Round the World—Singapore.
7.0 p.m.—Song Recital from the Concert House. Arioso from a Cantata (Händel). Songs (Schubert): (a) Gruppe aus dem Tartarus, (b) Der Doppelgänger, (c) Rastlose Liebe. Songs (Hugo Wolf): (a) Denk' es, o Seele, (b) Geselle, woll'n wir uns in Kütten hüllen, (c) Nimmersatte Liebe, (d) Der Freund. Songs and Dances of Death (Moussorgsky).
7.45 p.m.—Talk: Taxation in Sweden.
8.40 p.m.—Road Report by the Royal Automobile Club.
8.45 p.m.—A Dialogue.
9.15 p.m.—Concert of Light Music.
10.0 p.m. (approx.).—Close Down.

STRASBOURG (France)
Radio-Strasbourg (P.T.T.). 869 kc/s (345 m.); 15 kW.
Transmits at intervals from 11.0 a.m. to 6.15 p.m.—Gramophone Concert.
7.15 p.m.—News in French and German.
7.30 p.m.—Instrumental Concert.
8.30 p.m.—News Bulletin.
8.35 p.m.—Instrumental Concert.
10.30 p.m. (approx.).—Close Down.

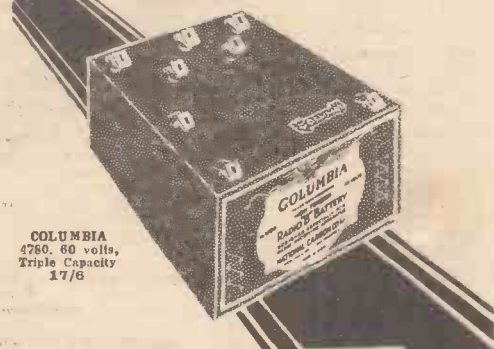
TOULOUSE (France)
Radiophonie du Midi. 779 kc/s (385 m.); 8 kW.
Transmits at intervals from 12.45 p.m.

6.0 p.m.—Transmission of Pictures.
6.15 p.m.—Exchange Quotations.
6.30 p.m.—Dance Music.
6.45 p.m.—Exchange Quotations, and Market Prices.
7.0 p.m.—Violin Recital.
7.15 p.m.—Musical Programme.
7.30 p.m.—News, and Market Prices.
7.45 p.m.—Selections by a Viennese Orchestra.
8.0 p.m.—Concert of Operetta Music. Selections from "Le Comte Obligado" (Moretti), "Les Dragons de Villars" (Maillart), "Les Noces de Jeannette" (Masse) and "La Mascotte" (Audran).
8.25 p.m.—Gramophone Records.
8.55 p.m.—Fashion Review.
9.0 p.m.—Time Signal.
9.2 p.m.—Orchestral Concert. In the interval, North African News.
11.0 p.m.—Recitations.
11.10 p.m.—Instrumental Music.
11.50 p.m.—Dance Music.
12 midnight.—News and Close Down.

VIENNA (Austria)
Radio-Wien. 581 kc/s (517 m.); 20 kW. Relayed by Graz, 851 kc/s (352 m.); Innsbruck, 1,058 kc/s (283 m.); Klagenfurt, 662 kc/s (453.2 m.); Linz, 1,226 kc/s (246 m.); and Salzburg, 1,373 kc/s (218 m.).
Transmits at intervals from 8.20 a.m. to 6.0 p.m.—Elementary Italian Lesson.
6.25 p.m.—Time, Weather, Alpine Weather Report and Programme Announcements.
6.30 p.m.—Talk on the Sound of Musical Instruments: Secondary Sound Phenomena—Resonance and Space Acoustics.
7.0 p.m.—"The Land of the Lotus Eaters." Comic Opera in Five Scenes (Carl Weinberger).
9.20 p.m. (approx.).—News Bulletin.
9.30 p.m. (approx.).—Orchestral Concert from the Hotel Krantz-Ambassador.

WARSAW (Poland)
Polskie Radio. 212 kc/s (1,411 m.); 14 kW.
Transmits at intervals from 10.40 a.m. to 6.40 p.m.—Radio Journal.
6.55 p.m.—Gramophone Records.
7.0 p.m.—Music Talk.
7.15 p.m.—Symphony Concert from the Works of Beethoven. In the interval, Theatre Review. After the Programme, Weather, Police and Sports Notes and Relay of Foreign Stations.

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W3XAL Boundbrook 49.18	PCJ Eindhoven	31.28
71.0 Nairobi	GSSW Ghelmsford	25.53
BSP Bangkok	W2XAD N.Y.	19.56

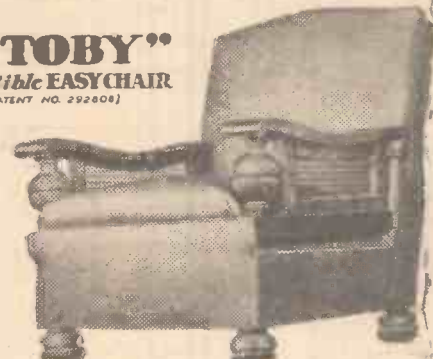
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PROGRAMMES FOR SATURDAY (February 14)

NOTE: THE HOURS OF TRANSMISSION ARE REDUCED TO GREENWICH MEAN TIME

ALGIERS (N. Africa)

825.3 kc/s (363.4 m.); 13 kW.
Transmits at intervals from 12.30 p.m.
7.0 p.m.—Concert of Oriental Music.
7.45 p.m.—Market Prices.
8.0 p.m.—Concert of Old and Modern Dance Music.
9.0 p.m.—Music Hall Programme.
9.30 p.m.—Au bal musette.
10.0 p.m.—Songs from Operas and Operettas.
10.30 p.m.—Gramophone Records.

BARCELONA (Spain)

Radio-Barcelona (EAJ1). 860 kc/s (340 m.); 8 kW.
Transmits at intervals from 8.0 a.m.
6.0 p.m.—Trio Music and News.
7.0 p.m.—Gramophone Records.
8.30 p.m.—Elementary German Lesson.
9.0 p.m.—Chimes, Weather, Exchange Quotations and Agricultural Report.
9.5 p.m.—Orchestral Concert.
10.0 p.m.—News Bulletin.
10.5 p.m.—Programme from Madrid.

BERLIN (Germany)

Königs Wusterhausen. 183 kc/s (1,635 m.); 35 kW.
Transmits at intervals from 5.20 a.m.
3.30 p.m.—Programme from Hamburg.
4.30 p.m.—Talk: The Animal World in Winter.
5.0 p.m.—Advanced French Lesson.
5.30 p.m.—Talk: New Excavations in Pergamon.
6.0 p.m.—The World of the Worker: a Dialogue between Hand- and Head-Workers.
6.30 p.m.—The Quiet Hour—Composition and Distraction.
6.55 p.m.—Weather for Farmers.
7.0 p.m.—Programme from Langenberg.
8.0 p.m.—Programme from Leipzig.
9.45 p.m. (approx.)—Dance Music from Berlin (Witzleben).
11.30 p.m. (approx.)—Close Down.

BERLIN (Germany)

Witzleben. 716 kc/s (418 m.); 1.7 kW.
Transmits at intervals from 6.0 a.m.
5.25 p.m.—Pianoforte Recital.
5.50 p.m.—Talk: The Theatre as an Educational Factor.
6.15 p.m.—Labour Market Report.
6.20 p.m.—Concert of Light Music from the Hotel Adlon.
7.30 p.m.—"Auf der Reeperbahn"—An Evening in a Suburban Theatre.
9.0 p.m.—Weather, News and Sports Notes.
9.15 p.m. (approx.)—Dance Music from the High School for Music Ball relayed from the Kroll-Festsaal.
11.30 p.m. (approx.)—Close Down.

BERNE (Switzerland)

Radio-Bern. 743 kc/s (403 m.); 1.1 kW.
Transmits at intervals from 6.0 a.m.
6.28 p.m.—Time and Weather.
6.30 p.m.—Josef Reinhart reads from his own works.
7.0 p.m.—Symphony Concert by the Basle General Music Society, conducted by Felix Weingartner, relayed from Basle, 941 kc/s (319 m.).
9.0 p.m.—News and Weather.
9.15 p.m.—Dance Music.
11.0 p.m. (approx.)—Close Down.

BRESLAU (Germany)

923 kc/s (325 m.); 1.7 kW.
Relayed by Gletwitz, 1,184 kc/s (253 m.).
Transmits at intervals from 10.15 a.m.
5.10 p.m.—Weather for Farmers, followed by Orchestral Concert.
6.0 p.m.—Recapitulation—a Review of the Week's Talks and Literary Intelligence.
6.30 p.m.—Weather, followed by Orchestral Concert of Sound Film Music.
7.0 p.m.—That will interest you!—Programme to be announced.
7.30 p.m.—Programme from Berlin (Witzleben). In the interval at 9.0 p.m.—Time, Weather, News, Sports Notes and Programme Announcements.
11.30 p.m. (approx.)—Close Down.

BRUSSELS (Belgium)

Radio-Belgique. 590 kc/s (509 m.); 15 kW.
5.0 p.m.—Dance Music from the Chantilly Tea-Room, Antwerp.
5.45 p.m.—Concert. Le rêve passe (Krier). Extase (Ganne). 1930 Pot-pourri (Nicolls). Talk. Selec-

tion (Pierné). Gavotte for 'Cello (Popper). Waltz from "Eva" (Lehar). Le cabriolet enchanté (Ackermans).

6.45 p.m.—Le Journal Parlé.
7.0 p.m.—Gramophone Records.
7.15 p.m.—Talk: The Binche Carnival.
7.30 p.m.—Gramophone Records.
7.45 p.m.—Le Journal Parlé.
8.0 p.m.—Orchestral Concert, conducted by A. Menelmans. Marche héroïque (Saint-Saëns). Pavane pour une Infante defunte (Ravel). Canadian Rhapsody (Gilson). Song, Selection from "La Gioconda" (Ponchielli). March (Schubert). Liebestraum (Liszt). Norwegian Rhapsody (Svendsen). Song. Selection from "Hérodiade" (Massenet). Ballet Music from "Henry VIII" (Saint-Saëns). In the interval at 8.45 p.m.—Talk: The Fight against Noise.
10.0 p.m.—News and Weather.

BRUSSELS No. 2 (Belgium)

887 kc/s (338.2 m.); 12 kW.
Transmits at intervals from 5.0 p.m.
Programme in Flemish.
7.0 p.m.—Gramophone Records.
7.15 p.m.—Talk: Modern Flemish Painting.
7.30 p.m.—Gramophone Records.
7.45 p.m.—Le Journal Parlé.
8.0 p.m.—Vocal and Orchestral Concert. In the intervals at 8.45 p.m.—Talk on the Poet Richard Minne, with Recitations.
10.0 p.m.—Le Journal Parlé.

BUDAPEST (Hungary)

545 kc/s (550 m.); 23 kW.
Transmits at intervals from 8.15 a.m.
6.0 p.m.—Reading.
6.30 p.m.—Orchestral Concert.
7.30 p.m.—Variety Programme.
8.30 p.m.—Concert from the Hotel Gelett, followed by Concert by a Tzigane Orchestra relayed from the Café Baross.

COLOGNE (Germany)

Westdeutscher Rundfunk, 1,319 kc/s (227 m.); 1.7 kW.
See Langenberg Programme.

COPENHAGEN (Denmark)

1,067 kc/s (281 m.); 1 kW.
Relayed by Kalundborg, 260 kc/s (1,153 m.).
Transmits at intervals from 6.30 a.m.
2.0 p.m.—Programme for Children.
2.30 p.m.—Instrumental Concert. Carnival March (Grétry). Dance from "The Czardas Princess" (Kálmán). Violin Solos (Henriques): (a) Cradle Song, (b) Canzonetta. Spanish Dance, No. 2 in G Minor (Moszkovsky). Serenata (N. Berg). Flora (Siede). Slavonic Dance (Glazounoff). Recital of Songs. Selections from "Once upon a time..." (Lange-Müller). Bella Mazurka (Waldteufel). Selection from "Lucia di Lammermoor" (Donizetti). Selection (W. R. Collins). A Smile, A Kiss (Nussbaum). Waltz from "Der Rosenkavalier" (R. Strauss). Overture, "Le Cheval de Bronze" (Auber).
4.40 p.m.—Exchange Quotations and Market Prices.
4.50 p.m.—Talk (to be announced).
5.20 p.m.—French Language Lesson.
5.50 p.m.—Weather and News.
6.15 p.m.—Time Signal.
6.24 p.m.—Report of the Christian Listeners' Association.
6.30 p.m.—Talk: The Violin Wizard, Niccolò Paganini.
7.0 p.m.—Town Hall Chimes.
7.2 p.m.—Recital from the Works of Niccolò Paganini. First Movement from the Violin Concerto in D Major. Caprices for Solo Violin. Variations on "A Carnival in Venice."
7.25 p.m.—Orchestral Concert of Old Time Dance Music.
8.30 p.m.—Readings.
8.55 p.m.—Flute Recital. Romance in D Flat Major (Saint-Saëns). Two Selections from the Suite, "La flûte de Pan" (Jules Mouquet).
9.10 p.m.—News Bulletin.
9.25 p.m.—Song and Pianoforte Recital.
10.0 p.m.—Dance Music from the Industri Restaurant.
11.0 p.m. (in the interval).—Town Hall Chimes.
11.15 p.m. (approx.)—Close Down.

CORK (Ireland)

(6CK) 1,337 kc/s (225 m.); 1.5 kW.
1.30 p.m.—Weather Forecast and Gramophone Records.
7.20 p.m.—Programme from Dublin.

CRACOW (Poland)

Polskie Radio. 1,229 kc/s (244 m.); 1.5 kW.
Transmits at intervals from 10.40 a.m.
6.10 p.m.—Programme from Warsav.
6.25 p.m.—Gramophone Records.
6.40 p.m.—Radio Journal.
7.0 p.m.—Programme from Warsav.
7.15 p.m.—Review of Foreign Politics for the Past Week.
7.30 p.m.—Programme from Warsav.
9.15 a.m.—Concert from the Works of Chopin.
9.50 p.m.—News from Warsav.
10.0 p.m.—Dance Music Programme.
11.0 p.m. (approx.)—Close Down.

DUBLIN (Ireland)

(2RN). 725 kc/s (413 m.); 5.5 kW.
1.30—2.0 p.m.—Time, Weather and Gramophone Concert.
7.20 p.m.—News Bulletin.
7.30 p.m.—Time and Irish Lesson.
7.45 p.m.—Talk (to be announced).
8.0 p.m.—Concert. The Augmented Station Orchestra in Instrumental Variety with Favourite Selections from Light Opera. The Augmented Station Orchestra: A Comedy Overture. "A Comedy of Cape Cod," by Mary O'Hea and Company. Cathal O'Byrne: Ulster Songs and Ballads. The Augmented Station Orchestra.
10.30 p.m.—Time, News, Weather and Close Down.

FRANKFURT-am-MAIN (Germany)

770 kc/s (390 m.); 1.7 kW. Relayed by Cassel, 1,220 kc/s (246 m.).
Transmits at intervals from 5.15 a.m.
6.15 p.m.—Time, Weather, News and Sports Notes.
6.20 p.m.—Spanish Language Lesson.
6.45—11.0 p.m.—See Mühlacker Programme.
9.10 p.m. (in an interval).—Time, Weather, News, and Sports Notes.
11.0 p.m. (approx.)—Close Down.

HAMBURG (Germany)

Norag (ha, in Morse). 806 kc/s (372 m.); 1.7 kW. Relayed by Bremen, 1,112 kc/s (270 m.); Flensburg, 1,373 kc/s (218 m.); Hannover, 530 kc/s (566 m.); and Kiel, 1,292 kc/s (232.2 m.).
Transmits at intervals from 5.20 a.m.
3.0 p.m.—Vocal and Orchestral Concert of Modern Music. Böcklin Suite (Woerysch). Aufbruch (Erdlen). Ballad for Tenor and Orchestra, Heimkehr zur Mutter (Platen). Passacaglia for Organ (Müller-Hartmann). Two North German Folk Ballads: (a) Dat Seelken vöer de Himmelsdöer (Erdlen). (b) Satanswief (Platen). Triple Fugue (Erdlen). Hanseatic Suite (Scheffer). Overture, "Hamlet" (Woerysch).
4.30 p.m.—Talk on Hanseatic Music Research: The South Seas—Musical and Literary Selections.
5.15 p.m.—Variety Programme.
6.55 p.m.—Weather Report.
7.0 p.m.—Cabaret Programme.
8.0 p.m.—The Life Work of the Waltz King Strauss—Second Series Orchestral Concert with Explanatory Notes.
9.0 p.m.—News Bulletin.
9.30 p.m.—Concert of Popular Songs by the Station Male Voice Quartet, the Orchestra and Soloists.

HEILSBURG (Germany)

1,085 kc/s (276.5 m.); 75 kW. Relayed by Danzig, 662 kc/s (453 m.).
Transmits at intervals from 5.30 a.m.
3.0 p.m.—Concert of Light Music.
4.5 p.m. (from Danzig).—Film Review.
4.20 p.m.—Literary Programme for Young People: Talk and Recitations for the 150th Anniversary of the Death of Lessing.
5.0 p.m.—International Market Prices.
5.10 p.m.—Ice Report and Market Prices.
5.30 p.m.—Motet Concert relayed from the Neurosgärter Church, Königsberg.
6.15 p.m.—Programme Announcements in Esperanto.
6.20 p.m.—Programme Announcements.
6.40 p.m.—Weather Report.
6.45 p.m.—Dancing Lesson.
7.30 p.m.—Programme from Berlin (Witzleben).
11.30 p.m. (approx.)—Close Down.

HILVERSUM (Holland)

160 kc/s (1,875 m.); 8.5 kW (transmitted from Huizen).
7.40—9.40 a.m.—Programme of the Workers' Radio Society (V.A.R.A.).
7.40 a.m.—Gramophone Records.
9.40 a.m.—Programme of the Liberal

Protestant Radio Society (V.P.R.O.)

9.55 a.m. till Close Down.—Programme of the V.A.R.A.
9.55 a.m.—Address, Concert and Recitations for Workers.
11.40 a.m.—Police Notes.
11.55 a.m.—Septet Concert and Gramophone Records.
1.55 p.m.—Gramophone Records.
2.10 p.m.—Talk by Mr. Polderman.
2.25 p.m.—Concert of Chamber Music.
3.55 p.m.—German Language Lesson.
4.25 p.m.—Gramophone Records.
4.40 p.m.—Talk by Mr. van Tussenbroek.
5.10 p.m.—Gramophone Records.
5.15 p.m.—Talk by Mr. Landré.
5.45 p.m.—Talk by Mr. Lindeijer.
6.0 p.m.—Literary Talk.
6.40 p.m.—Gramophone Records.
6.45 p.m.—Talk by Mr. Sluysen.
7.10 p.m.—Police Notes.
7.25 p.m.—Gramophone Records.
8.40 p.m.—Orchestral Concert, conducted by Hugo de Groot, with Baritone and Pianoforte Solos, Recitations, Address and Gramophone Records.
10.35 p.m.—Announcements.
10.45 p.m.—News Bulletin.
10.55 p.m.—Gramophone Records.

HUIZEN (Holland)

1,004 kc/s (298 m.); 8.5 kW. (transmitted from Hilversum).
7.40 a.m. till Close Down.—Programme of the Catholic Radio Society (K.R.O.).
7.40—8.55 p.m.—Gramophone Records.
11.10 a.m.—Religious. Address.
11.40 a.m.—Sextet Concert.
1.10 p.m.—Gramophone Records.
2.10 p.m.—Programme for Young People.
2.40—4.10 p.m.—Programme for Children.
4.40 p.m.—Gramophone Records.
5.40 p.m.—News in Esperanto.
5.55 p.m.—Press Review.
6.15 p.m.—Gramophone Records.
6.25 p.m.—Esperanto Lesson.
6.55 p.m.—Talk by Mr. Gescher.
7.25 p.m.—Orchestral Concert. March, Heil Europa (von Blon). Waltz, Dolores (Waldteufel). Potpourri, Musikalische Seifenblasen (Urbach). Gallop, Auf der Rennbahn (Lincke). Song, Servus du (Stolz). Faust Fantasia for Violin and Orchestra (Sarasate). Un peu d'amour (Silésu). Spanish Dance (Granados-Kreisler). En el jardin de Lindaraja (Nin). Spanish Dance (de Falla-Kreisler). Selection from "L'enfant et les Sortilèges" (Ravel - Dushkin). Waltz, Im Walzerrausch (Lincke). Angélus de la mer (Goubliet). Une fête à Trianon (Popy). Gavotte des baisers (Popy). Czardas (Kempner). Grossmütterchen (Lenger). In a Turkish Bazar (Dreyer). Potpourri, Sie hören jetzt (Dostal).
8.40 p.m. (in the interval).—News.
10.25 p.m.—Gramophone Records.
11.40 p.m. (approx.)—Close Down.

KALUNDBORG (Denmark)

Kalundborg Radio, 260 kc/s (1,153 m.); 10 kW.
See Copenhagen Programme.

KATOWICE (Poland)

Polskie Radio. 734 kc/s (408 m.); 16 kW.
Transmits at intervals from 10.40 a.m.
6.40 p.m.—News Bulletin.
6.55 p.m.—Report of the Association of Polish Youth.
7.0 p.m.—Reading and Talk.
7.30 p.m.—Concert of Light Music.
9.0 p.m.—Reading.
9.15 p.m.—Concert from the Works of Chopin.
9.50 p.m.—Weather. Programme Announcements in French and News Bulletin.
10.0 p.m.—Dance Music.

KAUNAS (Lithuania)

Radio-Kaunas. 155 kc/s (1,935 m.); 7 kW.
Transmits at intervals from 3.0 p.m.
6.10 p.m.—Talk on Zeal.
6.30 p.m.—Musical Interlude.
8.0 p.m.—Wireless Technical Talk.
8.20 p.m.—Evening Concert.

KÖNIGSBERG (Germany)

Ostmarken Rundfunk, 1,387 kc/s (216.3 m.); 1.7 kW.
See Heilsberg Programme.

LAHTI (Finland)

167 kc/s (1,796 m.); 54 kW. Relayed by Helsingfors, 1,355 kc/s (221 m.).
Transmits at intervals from 10.0 a.m.
5.15 p.m.—Concert of Finnish Music.
5.45 p.m.—A Visit to Tallinn: Interviews, Excursions to the Museum and Restaurants, etc.

LANGENBERG (Germany)

Westdeutscher Rundfunk. 635 kc/s (473 m.); 17 kW. Relayed by Aachen, Cologne and Münster, 1,319 kc/s (227 m.).
Transmits at intervals from 5.45 a.m.
4.0 p.m.—Concert of Contemporary Music. Rondo for Orchestra (Erdmann). Suite for Flute and Orchestra (Barthels). Little Concerto for Four Wind-Instruments and String Orchestra (Cohn). Tone Poem, Occulta universi (Herrig).
5.15 p.m.—Talk for Women: Additional Insurance for Employees.
5.40 p.m.—Talk: The Rhenish Shrovetide.
6.0 p.m.—Weather, Time, Economic and Sports Notes.
6.15 p.m.—Wireless Notes.
6.25 p.m.—Talk on Westphalian Moors.
6.45 p.m.—Variety Programme.—Carnival.
9.0 p.m.—News, Sports and Miscellaneous Notes, followed by Concert and Dance Music.
11.0 p.m.—Gramophone Records—Masters of Jazz.
12 midnight (approx.)—Close Down.

LEIPZIG (Germany)

Mitteldeutscher Rundfunk. 1,157 kc/s (259 m.); 2.3 kW. Relayed by Dresden, 941 kc/s (319 m.).
Transmits at intervals from 9.0 a.m.
3.30 p.m.—Orchestral Concert.
4.30 p.m.—Weather, Time and Wireless Notes.
5.0 p.m.—The Letter Box.
5.10 p.m.—German Language Lesson.
5.30 p.m.—Programme from Berlin (Witzleben).
6.0 p.m.—Talk on the 150th Anniversary of the Death of Lessing.
6.30 p.m.—Symphony Concert. The Unfinished Symphony in B Minor (Schubert). Concerto for Violin in E Minor, Op. 64 (Mendelssohn). Wedding March (Spohr).
7.30 p.m.—We present: "The Ambitious Man."
8.0 p.m.—Trical Talk.
8.10 p.m.—"Prince Orlofsky and Countess Maritza"—Revue (R. A. Sievers and H. P. Schmiedel).
9.30 p.m.—News, and Sunday Programme Announcements, followed by Dance Music.
11.0 p.m. (approx.)—Close Down.

MADRID (Spain)

Union Radio (EAJ7). 707 kc/s (424 m.); 2 kW.
Transmits at intervals from 8.0 a.m.
7.0 p.m.—Chimes, Exchange Quotations, Market Prices and Cinematograph Review.
7.30 p.m.—Dance Music.
8.5 p.m.—English Lesson by the Linguaphone Method.
8.25 p.m.—News Bulletin.
8.30—9.30 p.m.—Interval.
9.30 p.m.—Chimes, Time, Exchange Quotations and Musical Comedy Selection.
11.55 p.m.—News Bulletin.
12 midnight.—Chimes and Close Down.

MILAN (Italy)

Ente Italiano Audizioni Radiofoniche, 599 kc/s (501 m.); 8.5 kW. Programme relayed by Turin, 1,013 kc/s (296 m.) and Genoa, 958 kc/s (313.2 m.).
Transmits at intervals from 7.15 a.m.
6.20 p.m.—Announcements.
6.30 p.m.—Programme of Light Music.
7.15 p.m.—Giornale Radio; Weather.
7.30 p.m.—Time Signal.
7.32 p.m.—Talk in Commemoration of Vittorio Locchi.
7.45 p.m.—Transmission of an Operetta. Talk and Review of New Books in the intervals. After the Programme: Giornale Radio, and Concert from the Sala Gay, Turin.
10.55 p.m.—News Bulletin.

MOTALA (Sweden)

222.5 kc/s (1,348 m.); 40 kW. See Stockholm Programme.

MÜHLACKER (Germany)

Süddeutscher Rundfunk. 833 kc/s (360 m.); 75 kW. Relayed by Freiburg, 527 kc/s (570 m.).
Transmits at intervals from 5.15 a.m.
6.15 p.m.—Time Signal.
6.20 p.m.—Programme from Frankfurt.
6.45 p.m. (from Freiburg).—Accordion Recital. March, St. Galler (Claude). Concert Waltz, Gondolieri (Köhler). March, Banderillero (Gouhri). March, Hoh' Königsberg (Gaulden-schuh). Tales from the Vienna Woods (Joh. Strauss). March. Kapitän Lehmann (Köhler).
7.15 p.m.—"Prince Carnival"—a Carnival Revue (Hans Funk).

Programmes for Saturday—(Cont.)

8.30 p.m.—Professor Abel and his Jazz Singers. In Paris sind di Mädels so süß (Moretti). Das Mädchen vom Glück (Stolz). Hallo, du süße Frau (Heymann). Two Selections from "The Love Parade" (Scherzinger). Oh, Fräulein Grete (Llossas). Ich suche zum ersten ein Vorderzimmer (Abel). Was kann der Sigismund dafür (Gilbert). Das Lied ist aus (Stolz). Mein Bruder macht im Tonfilm die Geräusche (Amberg-Raymond).

9.10 p.m.—Programme Announcements, News and Weather.

9.30 p.m.—Gramophone Dance Music.

11.0 p.m. (approx.)—Close Down.

MUNICH (Germany)
563 kc/s (533 m.); 1.7 kW. Relayed by Augsburg, 536 kc/s (560 m.); Kaiserslautern, 536 kc/s (560 m.); and Nürnberg, 1,256 kc/s (239 m.). Transmits at intervals from 5.45 a.m.

5.45 p.m.—Violin and Pianoforte Recital.

6.15 p.m.—Wireless Notes.

6.30 p.m.—Orchestral Concert. Potpourri, Streiflichter (Morena). Waltz, Salzburg Chimes (Schmid). Serenade, Granada (Albéniz). Suite, At the Circus (Armandola). Waltz, Orihedein (Christl). Japanese Carnival (A. de Baque). The Phantom Melody (Ketelbey). Waltz, Alt-München (Zehentbauer). Selection from "Eva" (Lehár). Oriental Dance Scene, Baalat (Rüdinger). In Foxtrotlaune (Meyer-Helmund).

7.45 p.m. (from Nürnberg).—Variety Programme.

8.45 p.m.—The Dear Old Waltzes. Donauwellen (Ivanovici). Die Schönnbrunner (Lanner). Weana Mädl'n (Ziehrer). Roses of the South (Joh. Strauss).

9.20 p.m.—Time, Weather, News and Sports Notes.

9.45 p.m.—Orchestral Dance Music from the Park Hotel.

11.0 p.m. (approx.)—Close Down.

OSLO (Norway)
Kringkastingselskapet, 280 kc/s (1,071 m.); 75 kW. Relayed by Fredrikstad, 815 kc/s (368 m.); Hamar, 511 kc/s (587 m.); Nottodden, 671 kc/s (447.1 m.); Pors-

grund, 662 kc/s (453 m.); and Rjukan, 671 kc/s (447.1 m.). Transmits at intervals from 10.10 a.m.

6.30 p.m.—Talk by Paul Gjesdahl.

7.0 p.m.—Time Signal.

7.2 p.m.—Orchestral Concert.

8.35 p.m.—Weather, News and Topical Talk.

9.5 p.m.—Recitations.

9.35 p.m.—Gramophone Dance Music.

PARIS (France)
Eiffel Tower (FLE), 207 kc/s (1,445 m.); 15 kW.

9.30 a.m.—Time Signal on 113.2 kc/s (2,650 m.).

9.36 a.m.—Time Signal on 113.2 kc/s (2,650 m.).

5.45 p.m.—Le Journal Parlé.

7.10 p.m.—Weather Forecast.

7.20 p.m.—Dramatic Programme.

10.30 p.m.—Time Signal on 113.2 kc/s (2,650 m.).

10.36 p.m.—Time Signal on 113.2 kc/s (2,650 m.).

PARIS (France)
Poste Parisien, 914 kc/s (329 m.); 1.2 kW.

9.0 a.m.—Transmission of Pictures.

8.25 p.m.—Gramophone Records, Talk and News Bulletin.

9.0 p.m.—Concert. Prelude, "L'Ouragan" (Bruneau). Aquarelles (Le Borne). Allegretto and Presto from the Second Symphony (Brahms). Habanera (Aubert). Intermezzo from "Si" (Mas-cagni). Pastorale variée for Wind Instruments (Pierné). Selection from "Bertrand de Born" (Casadesus).

PARIS (France)
Radio-Paris (CFR), 174 kc/s (1,725 m.); 17 kW.

Transmits at intervals from 6.45 a.m.

12.30 p.m.—Gramophone Concert of Dance Music. In the intervals at 1.0 p.m.—Exchange Quotations and News, and at 1.30 p.m.—Exchange Quotations.

2.0 p.m.—Exchange; Market Prices.

3.0 p.m.—Exchange Quotations.

3.30 p.m.—Programme for Children.

4.30 p.m.—News Bulletin.

4.45 p.m.—Concert relayed from the Salle Gaveau.

6.30 p.m.—Market Prices.

6.35 p.m.—Agricultural Report and Racing Results.

7.0 p.m.—Talk arranged by the Union des Grandes Associations Françaises.

7.10 p.m.—Radio Dialogue.

7.30 p.m.—Advanced English Lesson.

7.45 p.m.—Commercial Prices, Economic and Social Notes and News.

8.0 p.m.—Reading.

8.30 p.m.—Sports Review and News.

8.45 p.m.—"Contes Breus" (Balzac), presented by M. Balpêtre and his Company.

9.15 p.m.—Press Review, News and Time Signal.

9.30 p.m.—Dance Music Programme.

POZNAŃ (Poland)
896 kc/s (335 m.); 1.9 kW.

Transmits at intervals from 6.0 a.m.

5.45 p.m.—Pianoforte Recital.

6.30 p.m.—Talk on Educational Problems.

6.45 p.m.—Talk on Eastern Questions.

7.0 p.m.—Talk: The Sociology of the Crowd.

7.15 p.m.—Miscellaneous Items and News.

7.30 p.m.—Programme from Warsaw. In the intervals, Theatre Review and Station Notes.

9.0 p.m.—Time, News, Sports and Police Notes.

9.15 p.m.—Miscellaneous Items.

9.30 p.m.—Dance Music from the Apollo Cabaret.

11.0 p.m. (approx.)—Close Down.

PRAGUE (Czechoslovakia)
Strasnice, 617 kc/s (487 m.); 5.5 kW. Relayed by Brno, 878 kc/s (342 m.), Bratislava, 1,076 kc/s (279 m.), and Moravská, Ostrava, 1,139 kc/s (263 m.) from 7.0—9.20 p.m. and 9.25—10.0 p.m.

Transmits at intervals from 10.15 a.m.

6.15 p.m.—News Bulletin.

6.20 p.m.—Slovakian Songs from Bratislava.

7.0 p.m.—Popular Programme.

8.0 p.m.—Brass Band Concert.

9.0 p.m.—Time, News and Sports Notes.

10.0 p.m.—Radio Film-Songs and Instrumental Music from Moravská-Ostrava.

ROME (Italy)
Ente Italiano Audizioni Radiofoniche (IRO), 680 kc/s (441 m.); 75 kW. Relayed by Naples, 905 kc/s (332 m.), and 2RO, 11,810 kc/s (25.4 m.).

Transmits at intervals from 7.15 a.m.

6.30 p.m.—Wireless Technical Lesson.

6.50 p.m.—Giornale Radio, News and Sports Notes.

7.0 p.m.—Announcements, Report of the International Institute at Geneva, and Press Review.

7.30 p.m.—Time Signal.

7.45 p.m. (approx.)—Rélây of an Opera from the Royal Theatre or the Teatro San Carlo, Naples. In the intervals.—Talk: Common Dangers of Keeping Domestic Pets, Reading of a Humorous Story and News.

STOCKHOLM (Sweden)
Radiotjänst (SASA), 689 kc/s (436 m.); 75 kW. Relayed by Boden, 250 kc/s (1,200 m.); Göteborg, 932 kc/s (322 m.); Hörby, 1,166 kc/s (257 m.); Motala, 222.5 kc/s (1,348 m.); Östersund, 389 kc/s (770 m.); Sundsvall, 554 kc/s (542 m.).

Transmits at intervals from 6.15 a.m.

5.45 p.m.—Talk: The Swedish Peasant.

6.15 p.m.—Introductory Talk to the following transmission.

6.30 p.m.—"Aida"—Opera in Four Acts (Verdi), relayed from the Royal Opera House. In the intervals at 7.20 p.m.—News, and at 8.20 p.m.—Weather Report.

10.0 p.m.—Modern Dance Music.

11.0 p.m. (approx.)—Close Down.

STRASBOURG (France)
Radio-Strasbourg (P.T.T.), 869 kc/s (345 m.); 15 kW.

Transmits at intervals from 11.0 a.m.

6.15 p.m.—Gramophone Concert.

7.15 p.m.—News in French and German.

7.30 p.m.—Instrumental Concert.

8.30 p.m.—News Bulletin.

8.35 p.m.—"Madame Butterfly"—Opera (Puccini), on Gramophone Records.

10.30 p.m.—Dance Music from the Caveau de l'Aubette.

12 midnight (approx.)—Close Down.

TOULOUSE (France)
Radiophonie du Midi, 779 kc/s (385 m.); 8 kW.

Transmits at intervals from 12.45 p.m.

6.0 p.m.—Transmission of Pictures.

6.15 p.m.—Exchange Quotations.

6.30 p.m.—Dance Music.

6.45 p.m.—Market Prices.

7.0 p.m.—Chansonettes.

7.15 p.m.—Military Music.

7.30 p.m.—News and Market Prices.

7.45 p.m.—Instrumental Selections.

8.15 p.m.—Light Music.

8.30 p.m.—Selections by an Argentine Orchestra.

8.55 p.m.—Fashion Review.

9.0 p.m.—Time Signal.

9.2 p.m.—Concert. Selections from "The Prophet" (Meyerbeer), "Benvenuto Cellini" (Berlioz), "Boris Godounoff" (Moussorsky), "The Tales of Hoffmann" (Offenbach), "Le Jongleur de Notre Dame" (Massenet), "Sigurd" (Reyer), "The Flying Dutchman" (Wagner), "The Mastersingers" (Wagner), "Sigurd" (Reyer), "Samson and Delilah" (Saint-Saëns) and "The Twilight of the Gods" (Wagner).

10.0 p.m.—North African News.

10.15 p.m.—Cello Recital.

10.30 p.m.—Russian Songs.

10.45 p.m.—Orchestral Music.

11.0 p.m.—Musical Programme.

12 midnight.—News and Close Down.

VIENNA (Austria)
Radio-Wien, 581 kc/s (517 m.); 20 kW. Relayed by Graz, 851 kc/s (352 m.); Innsbruck, 1,058 kc/s (283 m.); Klagenfurt, 662 kc/s (453.2 m.); Linz, 1,220 kc/s (246 m.); and Salzburg, 1,373 kc/s (218 m.).

Transmits at intervals from 8.20 a.m.

6.30 p.m.—Time, Weather, Alpine Weather Report and Programme Announcements.

6.35 p.m.—Concert by the Viennese Teachers' a cappella Choir.

7.20 p.m.—Orchestral Concert of Dance Music for Old and Young.

WARSAW (Poland)
Polskie Radio, 212 kc/s (1,411 m.); 14 kW.

Transmits at intervals from 10.40 a.m.

6.10 p.m.—Agricultural Report.

6.25 p.m.—Gramophone Records.

6.35 p.m.—Programme Announcements.

6.40 p.m.—Radio Journal.

6.55 p.m.—Gramophone Records.

7.0 p.m.—Talk: Memories of Old Discussions.

7.15 p.m.—Talk: The Leaders of the November Rising.

7.30 p.m.—Vocal and Orchestral Concert.

9.0 p.m.—Talk: The Warsaw Carnival a Hundred Years ago.

9.15 p.m.—Pianoforte Recital from the Works of Chopin.

9.50 p.m.—Weather, Police and Sports Notes.

10.0 p.m.—Dance Music Programme.

11.0 p.m. (approx.)—Close Down.

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Stations in Order of Frequencies and Wavelengths

Corrected in accordance with the latest official information available at the time of going to press

The power figures in black type represent revisions received so far under the new power-rating scheme

Kc/s	M.	Station	Dial Readings	Kc/s	M.	Station	Dial Readings	Kc/s	M.	Station	Dial Readings		
EUROPEAN													
(Including Stations connected with the European System.)													
153	1961	Ankara (Turkey), 2 kW.		761	394	Bucharest (Romania), 16 kW.		1211	247.7	Kalmar (relays Stockholm), 0.25 kW.			
155	1935	Kaunas (Lithuania), 7 kW.		770	390	Frankfurt (Germany), 1.7 kW.		1218.3	246.2	Schaerbeck (Brussels)(Belgium)			
160	1875	Huizen (Holland), 8.5 kW. (Hilversum programme and announcements.)		779	385	Toulouse (Radio) (France), 8 kW.				Turku (Abo) (Finland) (relays Helsinki), 0.6 kW			
167	1798	Lahti (Finland) (relays Helsinki), 54 kW.		788	381	Lwów (Poland), 2.2 kW.				Säffle (Sweden) (relays Stockholm), 0.4 kW.			
174	1725	Radio Paris (CFR), 17 kW.		797	376.4	Manchester (2ZY) (Gt. Britain), 1.2 kW.				Eskilstuna (Sweden) (relays Stockholm), 0.25 kW.			
183.5	1635	Königs Wusterhausen (Zeeseen) (Germany), 35 kW. Relays Berlin.		808	372	Hamburg (Germany), 1.7 kW.				Pietersaari (Jacobstad) (Finland) (relays Helsinki), 0.25 kW.			
193	1554.4	Daventry National Station (Gt. Britain), 35 kW.		810	370.4	Radio LL (France).		1220	246	Linz (Austria) (relays Vienna), 0.6 kW.			
202.5	1481	Moscow (Old Komintern) (RAI) (Russia), 40 kW.		824	364.1	Bergen (Norway), 1.13 kW.				Cassell (Germany) (relays Frankfurt), 0.3 kW.			
207.5	1445.7	Eiffel Tower (FLE), 15 kW.		825.3	363.4	Algiers (N. Africa), 13 kW.				Kiruna (Sweden) (relays Boden), 0.25 kW.			
212.5	1411	Warsaw (Poland), 14 kW.		833	360	Mühlacker (Germany), 75 kW.		1229	244	Cartagena (Spain), 0.4 kW.			
222.2	1350	Kasbah (Tunis), 0.5 kW.		842	358.3	London Regional Stn., 45 kW.		1238	242	Grazow (Poland), 1.5 kW.			
222.5	1348	Motala (Sweden) (relays Stockholm), 40 kW.		851	352	Graz (Austria) (usually relays Vienna), 9.5 kW.		1247	240.6	Belfast (2BE) (Ireland), 1.2 kW.			
230.6	1304	Moscow (Trades Unions), 75 kW		855.5	351	Leningrad (Russia), 1.2 kW.		1250	240	Stavanger (Norway), 0.5 kW.			
250	1200	Kharkov (Russia), RV 4, 25 kW.		860	349	Barcelona (Radio Barcelona) (EAI) (Spain), 8 kW.		1256	239	Radio-Beziers (France), 0.6 kW.			
260	1153	Istanbul (Turkey), 5 kW.		869	345	Strasbourg-Brumath (France), 15 kW.		1260.4	238	Nimes (France), 1 kW.			
268.6	1116	Boden (Sweden), 0.75 kW.		878	342	Brno (Czechoslovakia), 3 kW.		1265	237	Nürnberg (Germany) (relays Munich), 2.3 kW.			
272	1103	Reykjavik (Iceland), 1.5 kW.		887	338.2	Brussels No. 2 (Belgium), 12 kW. (Flemish programme).		1274	235.5	Bordeaux Sud-Ouest (France) 1 kW.			
279.6	1073	Kalundborg (Denmark) (relays Copenhagen), 10 kW.		896	335	Cadix (Spain), 0.5 kW.		1283	234	Örebro (relays Stockholm) (Sweden), 0.25 kW.			
280	1071	Novosibirsk (Russia) R.A., 4 kW.		905	332	Poznań (Poland), 1.9 kW.		1292	232.2	Kristiansand (Norway) 0.5 kW.			
300	1000	Moscow, Popoff (Russia), 40 kW.		914	328.2	Naples (INA) (Italy), 1.7 kW.				Lodz (Poland), 2.2 kW. Experimental.			
300	1000	Rostov-Don (Russia), 4 kW.		923	325	Grenoble (PTT) (France), 1.2 kW.				Kiel (Germany) (relays Hamburg), 0.3 kW.			
320	937.5	Oslo (Norway), 75 kW.		932	322	Paris—Poste—Parisien—(France) 1.2 kW.		1301	231	Boris (relays Göteborg) (Sweden), 0.2 kW.			
344.8	870	Leningrad (Russia), 20 kW.		941	319	Breslau (Germany), 1.7 kW.				Umeå (Sweden), 0.2 kW.			
357	840	Kharkov (Russia), RV 20.		950	316	Göteborg (Sweden), (relays Stockholm), 15 kW.		1319	227	Malmö (Sweden) (relays Stockholm), 0.75 kW.			
375	800	Tiflis (Russia), 4 kW.		958	313.2	Dresden (Germany) (relays Leipzig), 0.3 kW.		1337	224.4	Hälsingborg (Sweden) 0.25 kW.			
385	778	Nijni Novgorod (Russia), 1.8 kW.		968	309.9	Basle (Switzerland), 0.25 kW.		1346	222.9	Cologne (Germany), 1.7 kW.			
389	770	Kiev (Russia), 20 kW.		977	307	Sofia Rodno - Radio, (Bulgaria), 1 kW.		1355	221	Aachen (Germany), 0.3 kW.			
395	760	Petrozavodsk (Russia), 2 kW.		986	304	Marseilles (PTT) (France), 1.5 kW.				Münster (Germany), 0.6 kW.			
416.6	720	Östersund (Sweden), 0.75 kW. (relays Sundsvall).		995	301	Genoa (IGE) (Italy), 1.5 kW.				Cork (6CK) (Ireland), 1.5 kW.			
428	700	Geneva (Switzerland), 1.5 kW.		1004	298.8	Radio-Vitus (France).				Fécamp (France).			
442	680	Moscow (Experimental), 20 kW.		1022	293	Wilno (Poland), 0.5 kW.				Helsinki (Finland), 15 kW.			
511	587.1	Minsk (Russia), 4 kW.		1031	291	Cardiff (SWA) (Gt. Britain), 1.2 kW.				Karlstadt (Sweden), 0.25 kW.			
527	574.7	Lausanne (Switzerland), HB2, 0.6 kW.		1040	288.5	Zagreb (Yugoslavia), 0.7 kW.				Flensburg (Germany) (relays Hamburg), 0.6 kW.			
530	566	Hamar (Norway) (relays Oslo), 0.8 kW.		1044.6	287.2	Bordeaux-Lafayette (PTT) (France), 35 kW.				Ornskoldsvik (Sweden) 0.25 kW.			
531	565	Ljubljana (Yugoslavia) 2.8 kW.		1049	286	Aberdeen (2BD) (Gt. Britain), 1.2 kW.				Björneborg (Finland), 0.8 kW.			
545	550	Freiburg-im-Breisgau (Germany) (relays Stuttgart), 0.3 kW.		1058	283	Falun (Sweden), 0.65 kW.				Salzburg 0.6 kW. Relays Vienna.			
554	542	Hanover (Germany), 0.3 kW. (relays Hamburg).		1067	281	Hilversum (Holland), 8.5 kW.				Königsberg (Germany) 1.7 kW.			
563	533	Smolensk (Russia), 2 kW.		1071	280	Kosice (Czechoslovakia) 2.5 kW.				Halmstad (Sweden), 0.25 kW.			
572	525	Augsburg (Germany) (relays Munich), 0.3 kW.		1076	279	Limoges, PTT (France), 0.08 kW.				Radio Chatelineau (Belgium).			
581	517	Kaiserslautern (Germany) (relays Munich), 0.3 kW.		1085	276.5	Viipuri (Viborg) (Finland), relays Helsinki, 15 kW.				Warsaw, No. 2 (Poland), 1.9 kW. Experimental.			
585	511	Budapest (Hungary), 23 kW.		1098	273.2	British Relay Stations				Gävle (Sweden) (relays Stockholm), 0.2 kW.			
590	509	Sundsvall (Sweden), 15 kW.		1103	272	Bournemouth (6BM), 1.2 kW.				Jönköping (Sweden), 0.25 kW. (relays Stockholm).			
599	501	Munich (Germany), 1.7 kW.		1112	270	Bradford (2LS), 0.16 kW.				Leeds (2LS) (Gt. Britain), 0.16 kW.			
603.5	497	Munich (Germany), 1.7 kW.		1121	268	Dundee (2DE), 0.16 kW.				196	196	Karlskrona (relays Stockholm) (Sweden), 0.25 kW.	
617	487	Riga (Latvia), 13 kW.		1130	265.4	Edinburgh (2EH), 0.4 kW.				1714	175	St. Quentin (France).	
626	479.2	Vienna (Rosenhügel) (Austria), 20 kW.		1139	263	Hull (6KH), 0.16 kW.							
630	476	Archangel (Russia), 1.2 kW.		1148	261.3	Liverpool (6LV), 0.16 kW.							
635	473	Brussels No. 1 (Belgium), 15 kW.		1157	259	Newcastle (5NO), 1.2 kW.							
644	466	Lyons (La Doua), France (relays Ecole Supérieure), 2.3 kW.		1166	257	Plymouth (5PY), 0.16 kW.							
648	463	Tartu (Estonia).		1175	255	Sheffield (6FL), 0.16 kW.							
653	459	San Sebastian (EAJ8) (Spain), 0.3 kW.		1184	253	Stoke-on-Trent (6ST), 0.16 kW.							
662	453.2	Zürich (Switzerland), 0.75 kW.		1193	252	Swansea (5SX), 0.16 kW.							
680	441	Porsgrund (Norway), (relays Oslo), 1.5 kW.		1205	249	Lyons (Radio) (France), 0.5 kW.							
689	436	Salamanca (Spain), EAJ22, 1 kW.				Montpellier (France), 1.2 kW.							
694	432.3	Bolzano (Italy) 1BZ, 0.2 kW.				Berlin Relay (Germany), 0.6 kW.							
707	424	Danzig (Free City), 0.25 kW. (relays Königsberg)				Magdeburg (Germany), 0.6 kW.							
716	418	Klagenfurt (Austria), 0.6 kW. (relays Vienna).				Stettin (Germany) (relays Berlin), 0.5 kW.							
721.1	416	Tromsø (Norway), 0.11 kW.				Innsbruck (Austria) (relays Vienna), 0.6 kW.							
725	413	Uppsala (Sweden), 0.2 kW. (relays Stockholm)				Uddevala (Sweden), 0.1 kW. (relays Göteborg)							
734	408	Tampere (Tammerfors) (Finland) (relays Helsinki) 1 kW.				Varberg (Sweden), 0.3 kW.							
739	406	Nidaros (Trondhjem) (Norway), 1.35 kW.				Copenhagen (Denmark), 1 kW.							
743	403	Moscow (Russia), RA2, 1 kW.				Radio Liège (Belgium).							
748	401	Paris (PTT) (Ecole Supérieure) (France), 1 kW.				Bratislava (Czechoslovakia), 14 kW.							
752	398.9	Notodden (Norway), 0.9 kW.				Heilsberg (Germany), 75 kW. Relays Königsberg.							
		Rjukan (relays Oslo) (Norway), 0.17 kW.				Turin (Italy), 8.5 kW.							
		Aalesund (Norway), 0.4 kW.				Rennes (France), 1.2 kW.							
		Rome (IRO) (Italy), 75 kW.				Trollhätten, 0.3 kW. (relays Göteborg).							
		Stockholm (Sweden) 75 kW.				Hudiksvall, 0.2 kW. (relays Sundsvall).							
		Malmberget (relays Boden) (Sweden), 0.25 kW.				Norrköping (Sweden), 0.25 kW. (relays Stockholm).							
		Belgrade (Yugoslavia), 3 kW.				Bremen (Germany) (relays Hamburg), 0.3 kW.							
		Madrid (Union Radio) (EAI7), (Spain), 2 kW.				Barcelona (EAI13), Radio Catalana (Spain), 10 kW.							
		Berlin (Witzleben), 1.7 kW.				Oviedo (Spain), 0.7 kW.							
		Rabat (Morocco), 2.5 kW.				Lille (PTT) (France), 1 kW.							
		Dublin (2RN) (Ireland), 1.5 kW.				Moravska-Ostrava (Czechoslovakia), 11 kW.							
		Katowice (Poland), 16 kW.				London National Stn., 68 kW.							
		Kharkov (Russia), 4 kW.				Leipzig (Germany), 2.3 kW.							
		Berne (Switzerland), 1.1 kW.				Hörby (Sweden) (relays Stockholm), 15 kW.							
		Tallinn (Estonia), 0.7 kW.				Toulouse (PTT) (France), 1 kW.							
		Glasgow (5SC), (Gt. Britain), 1.2 kW.				Gleitwitz (Germany), (relays Breslau), 5.6 kW.							
						Almeria (Spain) (EAI18) 1 kW.							
						San-les-Pins (Nice) (France).							

DEVIATIONS

The following are the actual deviations from the official frequencies, as noted during measurements made at the Tatsfield Checking Station. All differences at 1.9 kc/s and over are shown.

607	494.2	Nidaros (Norway)
696	431	Belgrade (Yugoslavia)
704	426.1	Kharkov (Russia)
907.8	330.5	Naples (Italy)
926.6	323.7	Breslau (Germany)
953	314.8	Radio Vitus (France)
1013.5	299	Turin (Italy)

EXTRA-EUROPEAN STATIONS

U.S.A.		
662.1	454	New York (WEAF), 50 kW.
700	428.5	Cincinnati, O. (WLW), 50 kW.
720	416.6	Chicago, Ill. (WGN), 25 kW.
760	395	Bound Brook, N.J. (WJZ), 30 kW.
770	389	Chicago, Ill. (WBBM), 25 kW.
790	380	Schenectady (WGY), 50 kW.
800	375	Fort Worth, Tex. (WBAP), 10 kW.
980	306	Pittsburg, Pa. (KDKA), 50 kW.
990	303	Springfield, Mass. (WBZ), 15 kW.
1090	275.2	St. Louis (KMOX), 25 kW.
1100	272.6	Atlantic City, N.J. (WPG), 5 kW.
CANADA		
690	435	Calgary (CFCN), 1.8 kW.
690	435	Toronto (CKGW), 5 kW.
730	411	Montreal (CNRM), 1.6 kW.
AUSTRALIA		
665	451	Sydney (2FC), 5 kW.
690	435	Perth (6WF), 5 kW.
734	409	Adelaide (5CL), 5 kW.
779	385	Brisbane (4QC), 5 kW.
808	371	Melbourne (3LO), 5 kW.
838	358	Sydney (2BL), 5 kW.
INDIA		
840	357.1	Bombay (VUC) 3 kW.
810	370.4	Calcutta (VUB) 3 kW.

* See Deviation List.

For List of Short Wave Stations see page 192.

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