n°63. April 50

INFORMATIONS

Secretariat

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

Meeting of the Bureau

The first meeting of the Bureau of the Council, constituted under the 1949 Statutes approved at the Fifth General Assembly at Copenhagen, September 1949, took place in Paris, 20-21 January 1950.

The following are among the more important decisions taken :

1. It was decided to publicize meetings and symposia held under the auspices of the Unions, to a greater extent than heretofore, in « Science », « Nature » and « Experientia ».

2. It was decided that the next meeting of the Executive Board should take place at Berne, 10 and 11 August 1950.

3. It was agreed that the whole question of the organization of the Joint Commissions under their Mother Unions needed clarifying. A new Reglement would be presented to the Executive Board in August for their consideration.

4. The following nominations were made to the Policy Committee of the Bureau for the admission of new Unions, following the resolution of the Executive Board at Copenhagen : Prof. von Muralt, Prof. Stratton, Dr. Evans, Dr. Stagg, Prof. Caspersson, Lt. Col. Herbays.

Inter-Council Co-ordinating Committee

I.C.S.U.-C.C.I.C.M.S.-C.I.P.S.H.

This Committee, to co-ordinate the activities of the International Council of Scientific Unions, the Council for the Co-ordination of

International Congresses of the Medical Sciences, and the International Council for Philosophy and Humanistic Studies, has now been constituted.

The nominations made by the three Councils are as follows :

ICSU :

Professor A. VON MURALT (Berne) ;
Professor Emile BOREL (Paris) ;
Professor F. J. M. STRATTON (Cambridge, England).
Alternate member : Lt. Col. E. HERBAYS (Brussels).

CCICMS :

Professor J. MAISIN (Louvain, Belgium) ;
Professor P. MOUREAU (Liège, Belgium) ;
Dr. Kenneth SODDY (London).
Alternate member : Professor R. DEBRE (Paris).

CIPSH :

Professor H. A. Sommerfelt (Oslo) ;
Professor C. Hoeg (Copenhagen) ;
Professor R. FAWTIER (Paris).

In each case, a minimum of two members can represent their Council.

Calendar of International Meetings

1950

May 22-June 16, UNESCO, Florence, Italy : Fifth Session of the General Conference.

June 14-17, IUPAP, Rome : Colloquium on ultra acoustics.

June 27-28, IUTAM, Pallanza, Italy : First General Assembly.

Spring, ICSU, Paris : Committee on Science and its Social Relations.

July 10-15, IUPAP, Reading, England : Colloquium on semi conductors.

July 17-26, London : International meeting for optical Sciences.

August 10-11, ICSU, Berne : Executive Board.

Aug. 30-Sept. 6, Cambridge Mass., U.S.A. : International Mathematical Congress.

Sept. 4-6, ICSU, Brussels : Joint Commission on Ionosphere.

Sept. 11-22, URSI, Zurich : IXth. General Assembly International Scientific Radio Union.

Sept. 11-12, UNESCO, Paris : International Meeting of the Associations for the Advancement of Science.

1951

August 8-15, IAU, Leningrad : General Assembly, International Astronomical Union.

Aug. 21-Sept. 1, IGGU, Brussels : IXth. General Assembly, International Union of Geodesy and Geophysics.

IUPAP, Copenhagen : General Assembly, International Union of Pure and Applied Physics.

1952

Aug. 15-Sept. 15, Istanbul : International Congress for Applied Mechanics.

Summer, ICSU, Netherlands : Sixth General Assembly.

NATIONAL COMMITTEES

ITALIAN NATIONAL COMMITTEE

The Italian National Committee has been reconstituted as follows :

Honorary President : Prof. G. VALLAURI, Presidente, Istituto Elettrotecnico Nazionale « G. Ferraris », Corso Massimo d'Azeglio, 42, Torino (116).

President : Prof. C. MATTEINI, Largo G. Randaccio, 1, Roma (Tel. 35.104).

Members :

Prof. G. ABETTI, Direttore, Osservatorio Astronomico, Arcetri-Firenze.

Prof. F. AMOROSO, Via Tre Madonne, 16, Roma.

Prof. M. BOELA, Istituto Elettrotecnico Nazionale « G. Ferraris », Corso Massimo d'Azeglio, 42, Torino (116).

Prof. N. CARRARA, Direttore, Centro di Studio per la Fisica delle Microonde, Viale Morgagni, 48, Firenze.

Prof. A. CARRELLI, Istituto di Fisica dell' Università di Napoli.

Ammiraglio V. DE PACE, Comandante III Divisione Navale, Taranto.

Ing. M. FEDERICI, Via Nè, 33, Milano.

Prof. V. GORI, Istituto di Elettrotecnica dell' Università di Bologna.

Ing. T. GORIO, Direttore dell Istituto Sperimentale delle Poste e Telecommunicazioni, Viale Trastevere, 189, Roma.

Prof. G. LATMIRAL, *Secretary* of the Committee, Via Maghera, n. 10-*e*, Roma.

Prof. A. Marino, Via Guido d'Arezzo, 14, Roma.

Prof. E. Medi, Direttore dell' Istituto Nazionale di Geofisica, Vità universitaria, Rome.

Prof. U. Ruelle, Farouk University, Alexandria, Egypt.

Prof. A. Sabbatini, Istituto Sperimentale delle Poste e Telecomunicazioni, Viale Trastevere, 189, Roma.

Prof. L. Sacco, Lungotevere Flaminio, 22, Roma.

Prof. R. Sartori, Politecnico, Piazza L. da Vinci, Milano.

Prof. U. Tiberio, Accademia Navale, Livorno.

Prof. Fr. Vecchiacchi, Via Palestrina, 12, Milano.

Assitant Members :

Ing. A. Ascione, Istituto Sperimentale delle Poste e Telecomunicazioni, 189, Viale Trastevere, Roma.

Ing. G. Barzilai.

Prof. C. Egidi, Istituto Elettrotecnico Nazionale « G. Ferraris », Corso Massimo d'Azeglio, 42, Torino.

Prof. G. Francini, Istituto di Elettrotecnica dell' Università di Bologna.

Prof. D. Graffi, Università di Bologna.

Prof. S. Malatesta, Accademia Navale, Livorno.

Prof. E. Paolini, Piazza Grandi, 22, Milano.

Prof. A. Pinciroli, Istituto Elettrotecnico Nazionale « G. Ferraris », Corso Massimo d'Azeglio, 42, Torino (116).

Prof. L. Vallese,

and three Members to be designed by the Army Forces.

Delegates to U. R. S. I. Commissions :

Commission I : Prof. Fr. Vecchiacchi
Commission II : Ing. T. Gorio
Commission III : Prof. M. Boella
Commission IV : Prof. V. Gori
Commission V : Prof. G. Abetti
Commission VI : Prof. A. Marino
Commission VII : Prof. N. Carrara.

COMMISSIONS

COMMISSION III

On Ionosphere and Wave Propagation

Sir Edward V. Appleton, President of Commission III, is collecting the results of all ionospheric hourly measurements with a view to subjecting them to an examination from a world standpoint.

He is also collecting a complete set of all papers published on the ionosphere.

He would therefore be grateful to scientists and organizations willing to help him by forwarding such data and papers, either to him or to our General Secretariat.

Sir Edward's address is as follows :

Principal and Vice-Chancellor of the University,
Old College, South Bridge,
Edinburgh, 8 (Scotland).

Report from Ionosphere Research Committee (Science Council of Japan) for 1946-1948

by Y. HAGIHARA, Chairman

PART 1.

EXTRACTS

AIM OF RESEARCH. — The Committee has as its aim the study of ionosphere and of solarphysical, geophysical and other connected phenomena.

In order to achieve the aim of the committee the adjoining institutes are undertaking simultaneous co-operative observations.

Co-operative Observations. — The Committee is now improving and completing the research program of the simultaneous co-operative observations during the past several years.

The institutes participating in those observations are :

Solar phenomena. — Tokyo Astronomical Observatory ; Corona Station on Mt. Norikura belonging to the Tokyo Astronomical Observatory ; Mt. Ikoma Obervatory.

Geomagnetism. — Kakioka Geomagnetic Observatory ; Mitsui Geophysical Institute ; Mt. Aso Observatory ; Geophysical Department Tohoku University ; Geophysical Department Tokyo University.

Ionosphere. — Radio Propagation Section of Electrical Communication Laboratory and its branch stations ; Hiraiso Branch of the Electrical Communication Laboratory.

Tele-communication. — Ohira Laboratory of the Radio Bureau (Ministry of Electric Communication) ; Osaka Branche and Ono Receiving Station of the International Tele-communication Installation Division ; Komuro Receiving Station of the same Division ; Tokyo and Osaka Office of the Bureau of Electrical Communication Construction.

Night-sky light. — Astronomy Department Tokyo University ; Geophysics Department Tohoku University.

Cosmic rays. — Department for Cosmic Rays in the Scientific Research Institute ; Research Section of the Central Meteorological Observatory ; Physics Departement Nagoya University.

Earth current. — Kakioka Geomagnetic Observatory and its branch stations.

Solar noises. — Tokyo Astronomical Observatory.

Such simultaneous observations are planned to be carried out for about 10 days when anomalous phenomena are expected to occur.

After discussing the results of such observations the committee has decided to realize the necessity of undertaking simultaneous co-operative observations during calm conditions of the various phenomena concerned for an interval of one month in each of the four seasons of the year. It is absolutely necessary to continue such programs of observations throughout the whole period of

solar activity of 11.5 years. When a sufficient number of data of this kind of observations are carefully accumulated from all types of the related phenomena, the committee will be worth being proud of to have contributed a great deal to the progress of science.

Synthetic study of the co-operative observation. — The results of co-operative observations are reported and studied by the Committee working in its whole or in sub-committees.

Results obtained in 1946. — Notuki has pointed out that solar eruptions are more frequent when the Wolf number is greater and thus keep pace with the vicissitude of sun spot activity. Solar eruptions are known te be the cause of Dellinger phenomena, but the question whether the fadings of radio wave intensities are due to Dellinger phenomena or due to magnetic storms is at present very difficult to be decided. Ohno, Nagata, Nakata and others are endeavoring to get the exact criterion for settling the question. According to Ohno the Dellinger phenomena in 1946 has a tendency different from those occurred in the last spot maximum, that is, the duration of time necessary for decreasing to a minimum intensity was about several minutes in 1946 in comparison to two minutes in the last spot maximum. Hence it may be possible to avoid the radio fadings by a suitable device if the geomagnetic records are handed a sufficient time before their occurrence. Ohno has classified the radio fading phenomena according to the types of fading curves and the relation to geomagnetism and solar phenomena. Nagata has tried to judge the anomalous phenomena recorded by the co-operative observations on the basis of the current criterion and obtained the result that some anomalous phenomena evidently obey this criterion but still a moderate number among them are clearly against such criterion.

Whether the magnetic storms are due to ultraviolet radiation or due to corpuscular streams from the sun is not yet decided. The new tentative theory of Kato attributes the magnetic storm to the adjointment of the solar corpuscular streams to Earth's corpuscular equatorial current. A quantitative study on the timely variation of the ionospheric conditions accompanying a magnetic storm should be continued by basing on Imamichi's work on this topic. In order to make clear the magnitude of

variation of geomagnetic field in calm conditions Koshikawa has considered the characteristic number for geomagnetic variation and, by comparing it with Wolf number, discovered that the geomagnetic phenomena make their appearance about one day later than the solar phenomena. Osawa claimed the necessity of comparing the geomagnetism with the solar phenomena by putting weights on the spots near the sun's disc center if we adopt the view that the geomagnetic variation is due to corpuscular streams.

The correlation between the electron density in ionosphere and the sun spots is made clear, according to Minozuma, if we take the translated average of the mean values of Wolf numbers observed at several observatories. Ueda has pointed out the necessity of considering the horizontal and the vertical translation of ionosphere movement by analysing the diurnal variation of ionospheric phenomena and put stress on oblique emission of radio waves to ionospheric layers.

The results of synthetic study based on the co-operative observations are printed.

Results obtained during 1947. — The fruitful incomes of the co-operative studies during 1947 have overtaken the results of the preceding year by outweighing both in their quality and quantity.

To begin with the study on solar phenomena, K. Osawa has by discussing the plausibility of the neutral corpuscle hypothesis on ionosphere genesis, proposed a new quantitative method for estimating the corpuscular speed by ionosphere observations at sun-rise and sun-set as well as at eclipses. He also has pointed out the long durability of corona on the basis of the intensity measurement of corona by the coronagraph at climax and shown the electron density in F2 layer to be fairly affected by the corona intensity. Z. Suemoto has suggested that the Lyman continuum as the ionizing agency of ionosphere should not be considered as due to the black body radiation of 6000° K but should be computed theoretically by taking the emission and radiation mechanisms of the sun into account and claims the Lyman continuum to be due to the black body radiation of 5000°K, after the absorption

of the order of 10^{-5} by the chromosphere located on the reversing layer of black body temperature 6000° K. M. Notsuki claims the total number of sun-spots as the indicator of the solar activity in place of Wolf relative number in current use by pointing out its closer correlation to eruptions and other solar phenomena when due corrections are suitably made on the position of each spot on the solar disk.

T. Yamanouchi has long been working on the quantum mechanical computation of the transition probabilities of various atoms and ions prevailed in ionosphere and hence discussing the equilibrium state. M. Huruhata has determined the height of the layer emitting the night sky light by measuring the intensity variation of auroral transition lines and the red triplet of oxygen atoms, the D Lines of sodium and the first positive group of N2 molecules il the night sky light. He has obtained 200-450 km as the height of the layer, which is in agreement with the height of ionosphere during the night, and shown the variation of the height of the layer to be also in agreement with the variation of ionosphere height. On the other hand Y. Fujita obtained the temperature of the layer emitting the night sky light and the aurora borealis to be 500° K from the second positive group, 500° K from the first positive group and 100-1000° K from the negative group of N2 molecules in aurora by discussing the intensity distribution in the band spectra of night sky light and aurora. It has been accepted that the radio wave absorption in ionosphere is due to the collisions of electrons with neutral atoms or molecules. T. Yonezawa has shown the importance of the collisions of ions with electrons as the absorption agency by pointing out on the basis of Yamanouchi's quantum-mechanical computation of collision probabilities that the latter kind of collisions forms a larger part of absorption in F layer while it is not so important in E layer. By considering the durability of the radiation as the agency of the photo-ionization of F2 layer he also computed theoretically the recombination coefficient of electrons to ions and the attachment coefficient of electrons to neutral atoms and ions consistent with their values obtained formally from eclipse observations, by his own theory on the fluctuation of electron density in F2 layer based on mathematical statistics.

The value of our simultaneous co-operative observations is

highly appreciated in the work of Y. Aono. The commission has made co-operative observations on accurate measurement of the minimum frequency f_{min} for the comparative study on the variation of ionosphere and geomagnetism. Aono after examining the results of such observations, discovered that there exists a particular phase with the character of propagation in the variation of f_{min} and that the remaining part of the variation without the propagation character always corresponds to a Dellinger phenomenon. By separating these two parts he could explain the fading in the field intensity of the radio communication waves with England.

By a quantitative study based on a bulk of observational data of the variation of ionosphere H. Ueda has classified the variation into several types with regard to its diurnal variation, and found the fine structure of ionosphere, because the layers in current use and the abnormal layer proposed by Y. Nakata have been shown to be insufficient.

Further Ueda has discovered a zone of anomalous depression of ionosphere at about latitude 40°. T. Nagata and T. Fukushima decomposed the distribution of the electron density in F2 layer on the equator and in each of the two hemispheres into the daily mean term, the diurnal term, and the semi-diurnal term and studied statistically the secular and the seasonal variations for each of the various terms separately. It has been found that the semi-annual variation of large amplitude with its maxima at the equinoxes and in the same phase in the two hemispheres is superposed on the seasonal variation with the phase in opposite sense for the two hemispheres. As this distribution is in accord with the distribution of geomagnetic field over the earth, they believe that the corpuscles from the sun are the agency for ionization of ionosphere, and in particular the corpuscles should be at least in their larger part neutral owing to the existence of the remarkable diurnal term in the distribution. K. Senda tried to explain this seasonal variation by considering the atmospheric circulation and the expansion of F2 layer.

In order to justify their anticipation on the ground of the presence of the minimum frequency f_{min} for E layer reflexion that there should exist in the lower part or below E layer a layer called D, with small electron density and effective for radio wave

absorption, that is, with large frequency of occurrence of electron collisions, K. Maeda and Y. Aono have obtained the collision frequency of the order of 10^7 from the attenuation of D layer by discussing the difference of f_{Emin} due to the difference of the paths in the cases of vertical and oblique incidence. Aono has succeeded in establishing quantitative relationship between the measured values of f_{min} and the predicted values of the field intensity for moderate distance radio communication and hence invented a new method for predicting the field intensity. Contrary to the current view that the reflection by E or F layer is prevalent for short wave propagation, T. Kono has discovered after detailed study on E layer that the reflection by sporadic E layer plays an important role in the propagation mechanism, and clarified quantitatively the fact that radio waves can be received at such a short distance as unattainable by mere reflection on E or F layer especially in Summer when sporadic E layer is predominant. K. Miya and Y. Mitsui have devised a method for predicting radio wave propagation with higher degree of reliability by studying the systematic difference in the predicted and the measured values of the maximum usable frequency (MUF) on the distribution diagram of the critical frequencies of F layer over the world. S. Matsuo by discussing statistically the variation of field intensity in the radio communication with England, has shown a high correlation of this variation with the variations of geomagnetism and of ionosphere, when his own properly designed quantitative method representation is adopted. K. Ono has devised a method of representation for the condition of radio wave communication after a detailed study of the accumulated data with his skill and experience of many years.

One of the most remarkable topics of the commission is the discovery by M. Ota of the fact that the difference of the day means of the diurnal variation of the horizontal component of the geomagnetic field between Kakioka and Aso is in a fine and close but negative correlation with the day mean of electron density of F2 layer in Tokyo. T. Nagata and T. Fukushima realized the existence of bay type variation in the electron density of F2 layer and found a close correspondance between the bay type disturbances in the electron density of F2 layer and in the geomagnetic

field intensity. Ota imagines that the difference of the values of H in Kakioka and in Aso is proportional to the electric current in the east-west direction and this current on the other hand is proportional to the electric conductivity, and accordingly to the electron density. But the correlation is not clear in E layer but is distinctly negative in F2 layer. It is desirable to clarify this point of issue, which has been by itself one of the fruitful outcomes of the co-operative observations of our commission, by a further study of such observations continued with more care and precision. Nagata has proved theoretically that the various elements of ionosphere concerned with the geomagnetic variation accompanied with Dellinger phenomenon are only a 10 % part of those accompanied with diurnal variation, that, if the substance of ionosphere itself is actually in vertical movement by an amount at least 10 % of its apparent vertical movement, the diurnal variation of geomagnetic field increases by 20 to 30 % with the same mode of variation due to such actual vertical movement, and that the variation of the electron density accompanied directly with the bay type variation of geomagnetic field obeys quite a different law to the actually observed. This it is seen that not the whole of the measured geomagnetic variation is in unique correspondance with the variation of ionosphere, but that a simple cause brings out the two different variations in geomagnetism and in ionosphere. Y. Nakata has computed the variation of the magnetic field strength in ionosphere from the difference of the ordinary ray frequency f_o and the extraordinary ray frequency f_x caused by the double refraction of ionosphere and found that the magnetic field in F2 layer varies regularly according to the total magnetic field intensity in calm conditions but the disturbances is unexpectedly large in disturbed conditions.

M. Hirayama has analysed the distribution over the world of the annual means of geomagnetic field over the period 1922-1936 and discovered that the external magnetic field of the earth is governed by the sun-spot number. This shown, contrary to the current view, that the earth's external magnetic field should be the cause of the ionosphere. M. Ota on the other hand has, with a new representation of the geomagnetic activity, shown that the difference of the magnitudes and the form of geomagnetic diurnal variation in this representation scheme has quite signi-

ficant physical meaning. Y. Kato is continuing his research on his own particular theory on geomagnetic storms. He has found a very short period variation of period 1-2 seconds from his measurements of dH/dt with his own induction magnetograph, and attributed it to be due to the intruder charged particles bombarded into ionosphere. He considers the commencement of the suddenly occurring magnetic storms to consist of several stages depending on the relative location of the sun and the moon.

Y. Sekido studied the multiple correlation of cosmic ray intensity with the maximum electron density of F2 layer and the horizontal component H of geomagnetic field and found that the correlation between the F layer variation and H becomes more closely indicated when the multiple correlation of the three quantities are taken. He has also shown that the radio of the variation of H to the variation of cosmic ray intensity has distinct characteristic according to the geomagnetic activity and is inversely proportional to the cube of the radius of the equatorial current ring and this radius is on the other hand proportional to the energy of the corpuscles from the sun, if the variation of cosmic ray intensity is supposed to be due to the equatorial ring current and hence he suggested the method of estimating the speed of the solar corpuscles.

The reflection of radio waves by meteors has been observed by T. Kono with waves of frequencies above 20 Mc/s. He found that the ionizing action of meteors is greatly affected by the speed of meteors and that the reflection by meteoric swarms is relatively faint but the reflection by sporadic meteors is remarkable. He also estimated the streaming of the meteor system from the several variations of the occurrence frequency of such reflections in a manner similar to Hoffmeister's of deducing it from visual observation of meteors. Detailed investigation on this subject has been begun by the co-operation of the Tokyo Astronomical Observatory, the Astronomy Department of the Tokyo University and the Physical Institute for Radio Waves in order to clarify the mechanism of ionization by meteors.

(To be continued)

COMMISSION VI

On Waves and Circuits

The following letter was sent to the members of Commission VI, by Prof. Dr. Balth. VAN DER POL :

Genève, 22, Chemin Krieg.

« My dear Colleague,

» As you know the Plenary Session of the U. R. S. I. is scheduled to be held in Zürich from 11th.-22nd September, 1950.

» I feel sure that, as on former occasions, the 6th. Commission will again welcome papers and contributions on any items related to its general work. Nevertheless in view of recent scientific developments I suggest that some of the 6th. Commission's time be allotted to contributions and discussions on the following subject :

» *The amount of information which under specified conditions of noise, can be transmitted in a given time over a channel of a given band width.*

» We are aware that in different countries very important work on this subject has recently been done (mostly of a theoretical nature) and, for instance in France, on the initiative of Mr. Loeb, a symposium on this subject was held under the Chairmanship of Mr. Louis de Broglie.

» For your information I attach some references of recent scientific litterature on this subject which does not claim to be complete and is only meant as a guidance.

As this subject promises to be of great fundamental importance for the whole theory of communication technique I, as Chairman of Commission 6, would therefore welcome, at the above address, either any further detailed investigations of this subject, or any clarifying general survey of this intricate problem.

» Yours very sincerely,

(sgd) Prof. Dr. Balth. VAN DER POL,
Chairman Commission VI. »

REFERENCES

Gabor. — « Journ. Inst. Electrical Eng. » (London), Nov. 1946.
Gabor. — « Journ. Inst. Electrical Eng. » (London), Nov. 1947.
Shannon. — « Bell Syst. Tech. Journ. », July, Oct. 1948.
Ville. — « Câbles et Transmission », N° 1, page 61, 1948.
Wiener. — « Electronics », Jan. 1949.
Shannon. — « Proc. Inst. Rad. Eng. », Jan. 1949.
Weston. — « Phil. Mag. », April 1949, p. 449.
Tuller. — « Proc. Inst. Rad. Eng. », May 1949.
* *Wiener.* — Cybernetics (Wiley and Sons, New York), 1949.
* *Wiener.* — Extrapolation, Interpolation and Smoothing of Time Series (Wiley and Sons, New York).
Ville. — « Câbles et Transmission », Janvier 1950.

JOINT COMMISSION ON IONOSPHERE

We publish hereunder parts of a letter sent to the Members of the Commission :

8th. March, 1950.

« Dear Collegue,

» It has been decided to hold the second Meeting of our Commission in Brussels, on September 4th., 5th. and 6th. of this year. Fuller details will be circulated at a date nearer of the Meeting.

. . . . . .

» It is suggested that at the Meeting the following specific topics might be discussed :

» (*a*) Atmospheric Oscillations (Tides, etc.) ;

» (*b*) Region F2 anomalies ;

» (*c*) Ionospheric Storms ;

» (*d*) Formation of Ionospheric Layers ;

» (*e*) Magnetic Variations and Ionospheric Current Systems ;

» (*f*) Sporadic E Ionisation.

» As a Member of the Commission you are invited to submit contributions of up to about 1500 words on one or more of these topics. Since such contributions will materially contribute to

the success of our discussions at Brussels it is hoped that you will be able to respond to this invitation. We shall then arrange for such contributions to be duplicated and circulated to all Members of the Commission before the September meeting. It would be appreciated if you could please let the Secretary know as soon as possible whether you will send a contribution — if the MSS itself is then submitted before the end of June this will give time for duplicating and circulation before the meeting.

» It may be added that we are also inviting short contributions from various non-members of the Commission.

» An early reply to this letter would be much appreciated.

» Yours very sincerely,

E. V. Appleton, Chairman
W. J. G. Beynon, Secretary,
Department of Physics
University College of Swansea
Singleton Park
Swansea (Wales)
(Great Britain)

URSIGRAMS

France

Copies of the codes are available either at the General Secretariat of U. R. S. I., either at the Laboratoire National de Radioélectricité, 196, rue de Paris, Bagneux (Seine), France.

In the recapitulation, data (PIDB, MAG, CORON, etc.) constituting the daily Ursigrams, have been grouped under the observation dates of the physical phenomena described whatever the broadcasting day of data may be.

JANUARY 1950

Date		Text
1 =	PIDB	DIMANCHE NIL =
	SOL	01122 182X2 133X1 113X2 221X4 =
	SOLER	10545 10000 =
	MAGDI	CMBQC 11103 01115 71645 =
	CORON	00100 =
2 =	PIDB	LUNDI NIL =
	SOL	02NIL =
	SOLER	10545 20000 =
	MAGLU	CKBXX 20241 00251 =
	CORON	00200 =
3 =	PIDB	MARDI NIL =
	SOL	03NIL =
	SOLER	10545 30000 =
	MAGMA	COBYD 21018 91030 21135 01142 32200 02330 =
	CORON	00300 =
4 =	PIDB	MERCREDI NIL =
	SOL	04NIL =

```
      SOLER   10545  40000  =
      MAGME   CJDYB  21520  01534  21706  01714  =
      CORON   00400  =
5 =   PIDB    JEUDI  NIL  =
      SOL     05NIL  =
      SOLER   10545  50000  =
      MAGJE   BECRB  10618  00627  20945  00952  11010
              01016  21204  01211  =
      CORON   00500  =
6 =   PIDB    VENDREDI  NIL  =
      SOL     06NIL  =
      SOLER   10545  60000  =
      MAGVE   BDCXX  30000  00342  20504  00515  11052
              01100  =
      CORON   00600  =
7 =   PIDB    SAMEDI  NIL  =
      SOL     07611  171X4  242X1  251X1  286X1  =
      SOLER   10545  7XXXX  =
      MAGSA   CWBXX  10309  00315  10621  00633  10926
              00933  11152  01157  12348  02400  =
      CORON   00700  =
8 =   PIDB    DIMANCHE  NIL  =
      SOL     08NIL  =
      SOLER   10545  IXXXX  =
      MAGDI   BGAUB  =
      CORON   00800  =
9 =   PIDB    LUNDI  NIL  =
      SOL     09NIL  =
      SOLER   10545  20000  =
      MAGLU   DFCPB  20413  00418  11315  01318  11906
              01910  11933  01939  42141  02145  =
      CORON   00900  =
10 =  PIDB    MARDI  NIL  =
      SOL     10NIL  =
      SOLER   10545  30000  =
      MAGMA   DDCZD  40030  00040  40049  00100  40129
              00136  30048  00130  20242  00300  32321  =
```

CORON 11011 FFEGG GGHII IKMPQ STQOP PLKLK HHFFG FFEEE 01414 EFGFG GHIJK KJLNM NQNRR RPOPO MLKJI HGGFG 01637 =

11 = PIDB MERCREDI NIL =
SOL 11NIL =
SOLER 10545 40000 =
MAGME CYDZC 32200 02239 =
CORON 11110 FGGHG HIHIJ JLMOR RSPQT ROOMJ IHHII IHGFG 01699 FFFFF GHIII IJKMN PPMNN POPON MLHGG FFFFF 01372 =

12 = PIDB JEUDI NIL =
SOL 12NIL =
SOLER 10545 50000 =
MAGJE COBUC 11040 01048 =
CORON 01200 =

13 = PIDB VENDREDI NIL =
SOL 13NIL =
SOLER 10545 60000 =
MAGVE CDBIC =
CORON 01300 =

14 = PIDB SAMEDI NIL =
SOL 14NIL =
SOLER 10545 70000 =
MAGSA CDEYC 60327 10403 00412 50901 00906 20945 00955 21251 01254 41330 01430 31951 =
CORON 01400 =

15 = PIDB DIMANCHE NIL =
SOL 15NIL =
SOLER 10545 10000 =
MAGDI BICXX 20835 00840 11524 01533 12347 02357 =
CORON 11511 FGHII IJKKK KNQTR QQOOO OLJIJ IHHHI IHHGE 01608 EEEFF FFGGF FGGJK ONONR RTQNI HFEEE EEEEE 01171 =

```
16 = PIDB    LUNDI NIL =
     SOL     16922 141X1 232X1 262X1 266X1 271X1 =
     SOLER   10545 2XXXX =
     MAGLU   BDCXX 20545 00550 =
     CORON   01600 =
17 = PIDB    MARDI NIL =
     SOL     17NIL =
     SOLER   10545 3XXXX =
     MAGMA   CDBSC 10440 00450 =
     CORON   01700 =
18 = PIDB    MERCREDI NIL =
     SOL     18NIL =
     SOLER   10545 40000 =
     MAGME   CMBWC 20612 00618 22157 =
     CORON   01800 =
19 = PIDB    JEUDI NIL =
     SOL     19322 162X1 122X2 212X1 226X1 252X4 =
     SOLER   10545 50000 =
     MAGJE   ADCSD 21205 01211 =
     CORON   01900 =
20 = PIDB    RENF VENDREDI 1100 1107 EVAN
             VENDREDI 1100 =
     SOL     20NIL =
     SOLER   10545 60000 =
     MAGVE   DSBXX =
     CORON   02000 =
21 = PIDB    RENF SAMEDI 1416 1423 EVAN SAMEDI
             1416 =
     SOL     21NIL =
     SOLER   10545 70000 =
     MAGSA   BBDWC 40800 01245 21140 01148 21247
             01252 =
     CORON   02100 =
22 = PIDB    RENF DIMANCHE 0949 1000 DIMANCHE
             1455 1500 EVAN DIMANCHE 0949
             DIMANCHE 1455 =
     SOL     22332 172X1 142X2 136X1 12731 212X4
             23111 242X1 273X4 281X1 =
     SOLER   10545 10000 =
```

MAGDI DDCSB 20727 00736 20845 00851 =
CORON 02200 =

23 = PIDB LUNDI NIL =
SOL 23132 152X2 146X1 13741 112X4 22121 232X1 263X5 271X1 =
SOLER 10545 20000 =
MAGLU CPBWC 20701 00709 =
CORON 12311 FFFFG GIJKN UVVVT USROO OONLJ LJIJI HFEEF 02325 EEEEE FFFGI HJKJJ LLMOO QMMLL KIAZZ ZZZZZ 00942 =

24 = PIDB MARDI NIL =
SOL 24132 162X2 166X1 15751 121X4 21131 222X1 243X5 251X1 272X1 55701 91025 =
SOLER 10545 30000 =
MAGMA CIDNF 10257 00306 10421 00430 20534 00541 40914 01200 91454 91636 91928 =
CORON 02400 =

25 = PIDB MERCREDI NIL =
SOL 25NIL =
SOLER 10545 4XXXX =
MAGME DZCXX =
CORON 02500 =

26 = PIDB JEUDI NIL =
SOL 26233 192X2 196X1 18771 151X4 13151 122X1 11711 213X5 221X1 242X1 =
SOLER 10545 50001 07470 =
MAGJE CMDSC 10723 00728 =
CORON 12610 GGHIH IJJLM NOQSQ RSSRR QQLJI JIIHH FFFEE 01896 EEEFG HHGHI IJLMO OONNN QOKJI JIHGF EFFFF 01161 =

27 = PIDB VENDREDI NIL =
SOL 27133 161X4 14161 132X1 12721 113X5 211X1 232X1 =
SOLER 10545 60000 =
MAGVE CMDXX 10058 00106 11230 01239 31918 02012 =

CORON 12710 FFGFF GHHGI MORSS SOTSR
RRKGH IGHGG EEDDE 01734 EEFHI
HHHHI IJKOS QOOOT QQMLK IJJHG
GFFFF 01506 =

28 = PIDB SAMEDI NIL =
SOL 28NIL =
SOLER 10545 7XXXX =
MAGSA CKDSC 31643 01730 =
CORON 02800 =

29 = PIDB DIMANCHE NIL =
SOL 29NIL =
SOLER 10545 IXXXX =
MAGDI CHBRC =
CORON 02900 =

30 = PIDB LUNDI NIL =
SOL 30NIL =
SOLER 10545 20200 =
MAGLU CKBQD 30112 00209 11518 01528 32012
02100 =
CORON 13013 FFFGG HHIIH IKLQS TUPMO
NNIIH GGGEG GZZZZ 01360 ZZZZZ
ZZZZZ ZZZZZ ZZZZZ ZZZZZ ZZZZZ ZZZZZ
00000 =

31 = PIDB MARDI NIL =
SOL 31NIL =
SOLER 10545 30000 =
MAGMA CNBWD 11250 01257 =
CORON 03100 =

February 1950

1 = PIDB MERCREDI NIL =
SOL 01513 173X4 =
SOLER 10545 40000 =
MAGME BDCOB 10742 00753 =
CORON 10110 EFEEF GFFHG HIKMR RPOOP
MKJGE EFFEF FEEFE 01053 FGFFJ
HGGGI JIILO SLNLQ UTRNJ KHJGH
FEFFF 01494 =

```
2 = PIDB    JEUDI NIL =
    SOL     02112 183X4 =
    SOLER   10545 50000 =
    MAGJE   BDDUC 20833 00837 20857 00902 12024
            02036 =
    CORON   00200 =
3 = PIDB    VENDREDI NIL =
    SOL     03NIL =
    SOLER   10545 60000 =
    MAGVE   BDCGD 10634 00636 31927 02003 72321 =
    CORON   00300 =
4 = PIDB    SAMEDI NIL =
    SOL     04212 11711 272X1 =
    SOLER   10545 70201 15323 =
    MAGSA   CLDPE 20042 00103 10751 00800 20922
            00930 11403 01408 31530 01700 32024
            02200 =
    CORON   00400 =
5 = PIDB    DIMANCHE NIL =
    SOL     05112 12721 252X1 =
    SOLER   10545 10000 =
    MAGDI   CUBXX 10840 00845 10946 00953 31730
            01818 =
    CORON   00500 =
6 = PIDB    LUNDI NIL =
    SOL     06NIL =
    SOLER   10545 20000 =
    MAGLU   BECXX 11145 01151 11222 01231 =
    CORON   00600 =
7 = PIDB    MARDI NIL =
    SOL     07212 13211 =
    SOLER   10545 3XXXX =
    MAGMA   BCCSD 10232 00242 30346 00442 11933
            01944 32156 02348 =
    CORON   00700 =
8 = PIDB    MERCREDI NIL =
    SOL     08111 15221 282X1 =
    SOLER   10545 40000 =
    MAGME   CMDXX =
```

```
      CORON   00800  =
 9 =  PIDB    JEUDI  NIL  =
      SOL     09NIL  =
      SOLER   10545  50000  =
      MAGJE   DCCVD  10747  00756  32022  02112  =
      CORON   00900  =
10 =  PIDB    VENDREDI  NIL  =
      SOL     10NIL  =
      SOLER   10545  60000  =
      MAGVE   CDBXX  =
      CORON   10000  =
11 =  PIDB    SAMEDI  NIL  =
      SOL     11321  242X1  247X1  286X4  282X1  =
      SOLER   10545  70000  =
      MAGSA   AGCQB  21112  01121  =
      CORON   01100  =
12 =  PIDB    DIMANCHE  NIL  =
      SOL     12122  222X1  237X2  276X4  272X1  =
      SOLER   10545  10000  =
      MAGDI   CDBJC  11240  01250  11633  01642  =
      CORON   01200  =
13 =  PIDB    LUNDI  NIL  =
      SOL     13NIL  =
      SOLER   10545  20200  =
      MAGLU   BICJB  10804  00809  10816  00821  =
      CORON   01300  =
14 =  PIDB    MARDI  NIL  =
      SOL     14222  18211  15711  112X1  117X2  246X4
              242X1  282X2  271X1  283X1  =
      SOLER   10545  30000  =
      MAGMA   CEBMC  20258  =
      CORON   01400  =
15 =  PIDB    MERCREDI  NIL  =
      SOL     15NIL  =
      SOLER   10545  40000  =
      MAGME   CQBSC  10109  00115  21140  01153  21536
              01548  =
      CORON   01500  =
```

16 = PIDB JEUDI NIL =
SOL 16232 18732 142X1 137X2 216X4 212X1 252X3 251X1 253X1 61201 91050 =
SOLER 10545 50001 10500 =
MAGJE BICOB 10224 00234 =
CORON 11610 FGGGH GJJKL LNTUV RPLMN MJHHG FFEEG FGFFF 01519 FEEFF GFGFF FLKJL MNPQL NMOML HFEGF FFFEE 01051 =

17 = PIDB VENDREDI NIL =
SOL 17132 152X1 157X2 116X4 112X1 242X3 231X1 243X1 =
SOLER 10545 60000 =
MAGVE BICPB 11038 01051 11330 01344 =
CORON 11709 FFFGI HIJIN LMUVT QNMPM JIKKG FFFEF EGFFF 01509 FFEFF FFGGI KJMOP NNOPP MPNJH GFFGF FGFFF 01192 =
CORON 21710 ZAZAZ AZAZA ZAEEI JFGFF EAZAZ AZAZA ZAZAZ 00113 =
ZAZAZ AZAZA ZAZAZ AEGFG IFFEA AZAZA ZAZAZ 00089 =

18 = PIDB SAMEDI NIL =
SOL 18132 172X1 167X2 136X4 122X1 232X3 221X1 223X1 272X7 63201 90840 =
SOLER 10545 70001 14286 =
MAGSA BDCPA 11133 01142 11735 01738 22305 02325 =
CORON 11809 FFGFG HIHIJ NPSVT NOOPM KKJHF GGGFF EFFEE 01453 EFEEE FFFFH HKMPP ONNMO PQNLJ HFFFF FGFFF 01200 =
CORON 21810 ZAZAA AZAEE EFFLJ FFFEE AAZAA AZAZA ZAZAZ 00154 ZAZAZ AZAZA ZAEEG FEFFF HFFEA AZAZA ZAZAZ 00109 =

19 = PIDB DIMANCHE NIL =
SOL 19132 182X1 177X2 146X4 142X1 212X3 211X1 213X1 262X7 =

SOLER 10545 10000 =
MAGDI CSBZD 10314 00321 10600 00606 11100 01106 11328 01333 11345 01351 72340 =
CORON 01900 =

20 = PIDB RENF LUNDI 1520 1524 EVAN LUNDI 1255 LUNDI 1520 =
SOL 20NIL =
SOLER 10545 20000 =
MAGLU DPESG 20251 00256 20915 00921 91823 92055 92325 =
CORON 02000 =

Note : Possible disturbance in radio propagation.

21 = PIDB MARDI NIL =
SOL 21232 176X4 172X1 132X3 131X1 133X1 232X7 24211 251X1 271X1 =
SOLER 10545 30000 =
MAGMA GGFXX =
CORON 02100 =

22 = PIDB MERCREDI NIL =
SOL 22121 186X4 182X1 16221 142X3 141X1 143X1 222X7 23221 241X1 261X2 =
SOLER 10545 40000 =
MAGME DKCOE 21413 =
CORON 02200 =

23 = PIDB JEUDI NIL =
SOL 23121 18231 152X2 161X1 153X1 212X7 22231 231X1 241X2 =
SOLER 10545 50000 =
MAGJE CKFXX 81043 =
CORON 02300 =

24 = PIDB VENDREDI NIL =
SOL 24NIL =
SOLER 10545 60000 =
MAGVE FMCVE 62012 =
CORON 02400 =

25 = PIDB SAMEDI NIL =
SOL 25NIL =

SOLER 10545 70000 =

MAGSA ENCXX 20618 00627 20718 00727 20753
00803 40913 00946 =
41005 21008 01015 21326 =

CORON 02500 =

Note : Possible disturbance in radio propagation.

26 = PIDB DIMANCHE NIL =
SOL 25322 142X7 121X1 111X1 =
SOLER 10545 1XXXX =
MAGDI BGGIB 11940 01946 =
CORON 02600 =

27 = PIDB LUNDI NIL =
SOL 27112 131X1 121X1 12611 =
SOLER 10545 2XXXX =
MAGLU CHCXX 10958 01006 11309 01312 21418
01430 11430 01438 12000 02006 12154
02203 =
CORON 02700 =

28 = PIDB MARDI NIL =
SOL 28113 151X1 141X1 13621 288X1 =
SOLER 10545 30000 =
MAGMA CHDOC 10245 00251 10515 00321 20738
00745 21104 01118 =
CORON 02800 =

DOCUMENTATION

Periodicals, articles and books under this heading have been received at the Secretariat of the U. R. S. I. and may be communicated, on request, to Members of National Committees.

Periodicals

UNESCO

Courier, vol. III, nº 1, Feb. 1950 ; nº 2, March. 1950.

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

Monthly Bulletin of Information, nº 23, Jan.-Febr. 1950 :

Meeting of the Bureau of I.C.S.U. (see p. 3).

Unesco grants in aid to I.C.S.U. for 1950.

Inter-Council Co-ordinating Committee (see p. 3).

Joint Commission on Physics Abstracting.

Calendar (see p. 4).

AUSTRIA

Ionospheric Measurements, issued by the Ionospheric Station, Graz University, February 1950.

BELGIUM

Union of International Associations, Monthly Bulletin, nº 3, March 1950 ; nº 4, April 1950.

Centre de Contrôle des Radio-communications des Services Mobiles (C. C. R. M.).

Special Report. Radiotéléphonie des petits bateaux entre 1950 et 2450 kc/s.

Monthly Report M 2/50, Febr. 1950.

Monthly Report Aé 2/50, Febr. 1950.

Monthly Report Ph 2/50, Febr. 1950.

This report contains the results of the field strength measurements made at Brussels by the C. C. R. M. during February 1950, on the naval and aeronautical radiobeacons in the medium wave band.

Document 14/50.

During the whole day of March 15th. the C. C. R. M. has continuously explored the Aviation M. F. bands with two measuring equipments. The results have been at once communicated to the Belgian National Airport of Melsbroeck in order that the pilots be informed of the frequency changes without delay.

The C. C. R. M. think it will be useful to all its subscribers to receive the results of the frequency measurements made on the radiobeacons, aeronautical and meteorological stations without waiting for the publication of the March Monthly Reports : the data are correct to March, 17th.

New frequencies fo aviation services :

Following Doc. 14/50 which gave the frequency of aviation radiobeacons, aeronautical and meteorological stations on March 17th., 1950, this document gives the situation on March 22nd, 1950.

FRANCE

Bulletin d'Information du Laboratoire National de Radioélectricité, 4th year, 1949, n° 8, measurements made in Aug. 1949; n° 9, measurements made in Sept. 1949.

GREAT BRITAIN

Predictions of Radio Wave Propagation Conditions, issued by the Radio Research Laboratory, Bul. A, n° 40, Jan. 1950, for June 1950; n° 41, Febr. 1950, for July 1950.

Monthly Bulletin of Ionospheric Characteristics, issued by the Radio Research Laboratory, n° B. 36, Febr. 1950, measurements of Oct. and Nov. 1949.

Bulletin of Radio Atmospheric Noise Measurements, issued by the National Physical Laboratory, Radio Division.

Bul. C. n° 35, Jan. 1950, measurements at Tatstfield (Oct. and Nov. 1949) and at Johannesburg (Sept., Oct. and Nov. 1949).

Bul. C. n° 36, Febr. 1950, measurements at Tatstfield and Johannesburg (Dec. 1949) and at Colombo (Oct., Nov., Dec. 1949).

Bul. C n° 37, Febr. 1950, measurements at Tatstfield (Jan. 1950) and at Malta (Oct., Nov., Dec. 1949).

Bul. C. n° 38, Febr. 1950, measurements at Colombo, Malta and Johannesburg (Jan. 1950).

Marconi Review, vol. XVII, n° 96, 1st Quarter 1950.

ITALY

Geofisica Pura e Applicata, vol. XV (1949), fasc. 3-4.

SWEDEN

Ionospheric Measurements at Kiruna, issued by the Wave Propagation Observatories, Research Laboratory of Electronics, Gothenburg, February 1950.

UNITED STATES

Basic Propagation Predictions, issued by the National Bureau of Standards, CRPL. Series D, n° 67, March 1950 for June 1950.

Articles — Works — Books

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

Summary record of the First Meeting of the Bureau (Jan. 20-21).

Reports on the activities of the Council and its constituent organizations.

INTERNATIONAL UNIONS

International Union of Biological Sciences, Agenda of the Xth General Assembly, Stockholm, 7-11 July 1950.

International Electrotechnical Commission, Statutes and Rules of Procedure, June, 1949.

International Union of History of Sciences : Program of the IInd General Assembly, Amsterdam, August 1950.

AUSTRALIA

Experimental designs balanced for the estimation of residual effects of treatments, E. J. WILLIAMS, reprint from the *Austral. Journ. of Scient. Research*, Series A, Phys. Sciences, vol. 2, n° 2, p. 149-168, 1948 (Copies of this work have been distribued to National Committees).

ITALY

Exchanges of power within the framework of European economic cooperation, by C. CIRIELLO, reprint from *Mondo Aperto* (English and Italien text).

NETHERLANDS

Netherlands Export Book Catalog, 1950.

Extracts :

BREMMER, H. — Terrestrial Radio Waves. Theory of Propagation. Amsterdam, Elsevier, 1949. With ills., med., in-8, 354 p.

DAMMERS, Dr. B. G., Ing. J. HAANTJES, J. OTTE und Ir. H. v. SUCHTELEN. — Anwendung der Elektronenröhre in Rundfunkempfängern und Verstärtern. (Philip's Bücherreihe über Elektronenröhren, Band IV). (Ubersetzt aus dem Holländischen von W. FEINER). ie. Aufl. Amsterdam, Meulenhoff & Co, 1949. Mit 256 Abbildungen, in-12, 468 Seiten.

DAMMERS, Dr. B. G., Ing. J. HAANTJES, J. OTTE and SUCHTELEN. — Applications of the electronic valve in radio

receivers and amplifiers. (Philips Technical Library, Series of Books on Electronic Valves, Book IV). Translated by ALEXANDER. Amsterdam, Meulenhoff & Co. 256 ill., in-12, 467 p.

DAMMERS, E. C., HAANTJES, J., OTTE, J. et van SUCHTELEN, H. — Utilisation du tube électronique dans les radiorécepteurs et les amplificateurs. (Bibliothèque Technique Philips, Série Tubes Electroniques, volume IV). (Traduit par E. CLÉMENT). Amsterdam, Meulenhoff & Co. 256 fig., in-12, 468 p.

DEKETH, J. — Bases de la technique des tubes de TSF. (Bibliothèque Technique Philips, Série Tubes Electroniques, vol. 1). (Traduit par E. CLÉMENT). Amsterdam, Meulenhoff & Co. 370 graphiques et illustrations, 67 photos, in-12, 586 p.

DEKETH, J. — Caractéristiques et montages des tubes récepteurs et amplificateurs modernes. (Bibliothèque Technique Philips, Série Tubes Electroniques, vol. II). (Traduit par E. CLÉMENT). Amsterdam, Meulenhoff & Co. 532 fig., in-12, 412 p.

DEKETH, J. — Data and circuits for receiving and amplifying valves. (Philips Technical Library, Series of books on electronic valves, Book II). (Translated by Mr. G. DU GLOUX). Amsterdam, Meulenhoff & Co. 532 ill., in-12, 405 p.

DEKETH, J. — Daten und Schaltungen moderner Empfänger- und Kraftverstärkerröhren. (Philips' Bücherreihe über Elektronenröhren, Band II). 5e Aufl. 16e Tausend. Amsterdam, Meulenhoff & Co, 1948. Mit 532 Abb., 412 Seiten, in-12.

DEKETH, J. — Fundamentals of radio valve techniques (Philips Technical Library, Series of books on electronic valves, Book I). (Translated by F. GARRATT). Amsterdam, Meulenhoff & Co. 384 ill., in-12, 547 p.

DEKETH, J. — Grundlagen der Röhrentechnik. (Philips' Bücherreihe über Elektronenröhren, Band I). 4e Aufl., 14e Tausend. Amsterdam, Meulenhoff & Co, 1947. Mit 296 Strichklishees und 65 photographischen Abbildungen, in-12, 560 Seiten.

DEKETH, J. — Radioröhr och der as användning. (Philips Technical Library). (Text in Swedish, translation by Prof. E. LÖFGREN). Amsterdam, Meulenhoff & Co.

GEERLINGS, H. G. — De invloed van de atmosfeer en de warmtebehandeling bij het electrisch lassen. Amsterdam, Elsevier, 1946. With ill., dem. in-8, 162 p.

HEYBOER, P. J. — Senderröhren. (Philips' Bücherreihe über Elektronenröhren, Band. VII). (Ubersetzt aus dem Holländischen von W. FEINER). Amsterdam, Meulenhoff & Co. 330 Seiten, mit 260 Strichklischees und 25 photographischen Abbildungen, in-12.

HEYBOER, P. J. — Transmitting valves. (Philips Technical Library, Series of Books on Electronic Valves, Book VII). (Translated by Mr. G. DU CLOUX). Amsterdam, Meulenhoff & Co, Spring 1950. With 285 ill., in-12, 350 pp.

HEYBOER, P. J. — Tubes d'émission. (Bibliothèque Technique Philips, Série Tubes Electroniques, vol. VII). (Traduit par E. CLÉMENT). Amsterdam, Meulenhoff & Co. Avec 260 fig. et graphiques et 250 photos, in-12, 330 p.

OTTE, J. — Caractéristiques et montages des tubes récepteurs et amplificateurs modernes (1er supplément). (Bibliothèque Technique Philips, Série Electronique, vol. III). (Traduit par G. de BRABANDER et E. CLÉMENT). Amsterdam, Meulenhoff & Co. 267 fig., 220 p.

OTTE, J. — Data and circuits of modern receiving and amplifying valves. (1st supplement). (Philips Technical Library, Series of books on electronics valves, Book III). (Translation by Mr. G. du CLOUX, London). Amsterdam, Meulenhoff & Co. 267 ill., in-12, 220 p.

OTTE, J. — Daten und Schaltungen moderner Empfänger- und Kraftverstärkerröhren. 1. Ergänzungsband. (Philips' Bücherreihe über Elektronenröhren, Band. III). ie Aufl., 13e Tausend. 1942, Amsterdam, Meulenhoff & Co, 1947. Mit 267 abb., in-12.