Bulletin N° 106 November-December 1957

International Scientific Radio Union

U. R. S. I.

CONTENTS

GENERAL SECRETARIAT

New address

The General Secretariat of U.R.S.I. is located.

7, Place Emile Danco,
Brussels 18,
Belgium

Telephone number : 43.76.78.

INFORMATIVE PAPERS

At the sessions of the Executive Committee held in Boulder during the last General Assembly it was recommended that informative papers on international organizations with which U.R.S.I. cooperates or is connected by common links, should be published in the *Information Bulletin.*

It has been found interesting to start such a series of papers with a survey of our Union, its origin, its structure and its general development.

U.R.S.I.

by E. HERBAYS, *Secretary General*

Introduction

It is a fact generally agreed that it is in the field of radio-science, with its broadest meaning, that the international co-operation towards which so many efforts trend, finds its full development. The waves investigated by this science recognize no boundaries : originating in one part of the earth they propagate on its whole surface, fill the space surrounding the earth and reach the World's confines. Waves originating from celestial objects thousands years ago, radiate through our aerials, these emitted by the Sun affect geophysical phenomena which rule the terrestrial life.

All this explains the imperious need for the scientists not to confine in their laboratories or in the few square kilometres of their national territories. The Earth itself is not wide enough for the radiophysicist, this was felt at the beginning of this century by the precursors of U. R.S.I.

1. — Commission Internationale de Télégraphie Scientifique (T.S.F.S.)

(International Commission on Scientific Wireless Telegraphy)

In 1912, two scientists, Dr. R. B. Goldschmidt, Brussels, and Professor Schmidt, Halle, considering that « research on the laws of electromagnetic wave propagation needed the cooperation of a large number of observers in largely spaced sites », laid the foundation of a central organization able to coordinate the means and ways in order to undertake :

1° research on electric wave propagation,

2° radiotelegraphy measurements, and

3° generally, study of related problems,

Dr. Goldschmidt was giving to this organization the disposal of his transmitting station built in the royal estate of Laeken near Brussels.

At a preparatory meeting held in Brussels on October 13, 1913, the following were present :

Professor Abraham, Paris,
Professor Benndorf, Graz,
W. Duddell, London,
Commandant Ferrié, Paris,
Dr. Goldschmidt, Brussels,
Prof. Schmidt, Halle,
Prof. Vanni, Rome,
Prof. Wien, Iena,
Prof. Wulf, Valkenburg.

Provisional statutes and a preliminary working programme were drafted by this meeting. The programme included :

1° determination of means needed to insure the constancy of the transmission from the Laeken station and to check this constancy,

2° relative measurements at various receivers of signal variations corresponding to wavelength and characteristic changes in the transmission of the above mentioned station,

3° comparison of the strength of signals received in various directions and distances from the emitting station,

4° simultaneous measurements at the various receiving stations of disturbances due to atmospherics.

It is to be noted that the problems to which the attention of the authors of the above programme was drawn, are still included amongst the major activities of U.R.S.I.

During the following meeting held in Brussels, from April 6 to 8, 1914, representatives of Austria, Belgium, France, Germany, Great Britain and Holland founded the « Commission International de Télégraphie Sans Fil Scientifique », drafted statutes and adopted the working programme set up by the preparatory meeting.

The International Commission put its future into the hands of a Board appointed as follows :

W. DUDDELL (England), *President*,

Prof. WIEN (Austria), *Vice-President*,

Dr. R. B. GOLDSCHMIDT (Belgium), *Secretary General*,

R. BRAILLARD (France), *Assistant Secretary*.

H. M. ALBERT, King of the Belgians, had accepted to be Honorary President of the Commission.

Three only of the six countries represented at the meeting, had appointed a National Committee, namely, Belgium, England and France.

The 1st World War put an end to the activities of the International Commission.

2. — International Scientific Radiotelegraphy Union U.R.S.I.

In 1919 some members of the « Commission Internationale de Télégraphie sans fil Scientifique » considering that the discoveries and developments reached during the First World War had increased the need for international cooperation to study radio phenomena, decided to bring the Commission Internationale to revival.

The development of scientific techniques and applications showed that there was no more need for an experimental station, the existing emitters and the laboratories established since 1914 could

easily meet the need of scientists. What had to be constituted was a centralizing body whose aims should be :

1° the organization of meetings of radiophysicists in view to give them the opportunity of exchanging their views and opinions on such features which were ill-defined or not enough known,

2° the establishement of contacts between radioelectricity laboratories in order to compare measurement methods and researches,

3° the liaison between scientists and laboratories of countries concerned with radioelectricity.

Relying on those considerations, the International Commission drafted the statutes of an international Union whose aims were :

1° to promote and organize researches requiring international cooperation, and the scientific discussion and publication of these researches,

2° to promote the setting up of common methods of measurements as well as the intercomparison and standardization of the measuring instruments used in scientific work.

The statutes were submitted in July 1919 to the Constituting Assembly of the International Research Council which became later the International Council of Scientific Unions. This Assembly approved the Statutes and adopted a proposal in view to transform the International Commission into an association adhering to the International Research Council.

To reach their aims, the promoters of the Union strove to set up, first in their respective countries and later in other countries showing some interest in radioelectricity, groups called « National Committees » with the same aims as the Union.

The organization and discussion of researches were entrusted to Commissions whose activity was, and is still, solely scientific. At the outset of the Union its various activities were shared out between four Commissions :

I. On Measurements and Standardization,

II. On Radio Wave Propagation,

III. On Atmospherics,

IV. On Cooperation with Amateurs.

A fifth Commission on Radiophysics was set up in 1927.

It was further decided to organize periodically General Assemblies to discuss discoveries and researches made by the National Committees under the stimulus of the Commissions. During the Assemblies coordination of research work had to be reached by the drafting of working programmes in fields where international cooperation was found desirable.

It should be noted that previous to 1927, year of the IIth General Assembly of U.R.S.I., nine National Committees were established.

3. — International Scientific Radio Union

During the third General Assembly held in Brussels in 1928, the Union decided to change its former name into International Scientific Radio Union.

Since then, the fourth General Assembly was held in Copenhagen, 1931, the fifth in London, 1934, and the sixth in Venice and Rome, 1938.

The regular course of General Assemblies and the activity of the Union were interrupted by the Second World War. However, due to some devoted individuals and to the help given to the General Secretariat by some National Committees which were able to communicate with the central office, as soon as the hostilities were over, the Union was able to resume its normal life and to hold the seventh General Assembly in Paris in 1946.

This meeting gave the National Committees the opportunity to renew contacts and brought to U.R.S.I. a new scope.

This new impetus was confirmed by the eight Assembly held in Stockholm in 1948. This meeting considering the spreading of some fields of radioscience decided to split out the activities of three Commissions and to bring their total number to seven :

I. On Measurements and Standardization,

II. On Troposphere and Wave Propagation,

III. On Ionosphere and Wave Propagation,

IV. On Terrestrial Atmospherics,

V. On Extra-Terrestrial Radio Noise (in 1950 the name was changed into « Radio Astronomy »),

VI. On Waves and Circuits,

VII. On Electronics.

These names were changed as follows at the General Assembly held in The Hague in 1954 :

I. Radio Measurements and Standards,
II. Radio and Troposphere,
III. Ionospheric Radio,
IV. Radio Noise of Terrestrial Origin,
V. Radio Astronomie,
VI. Radio Waves and Circuits,
VII. Radioelectronics.

If we did not fear to write a paper too long for its aims, we would mention the scientific activities of the Commissions and of their various Sub-Commissions, we could also mention the development reached due U.R.S.I.'s iniative in various scientific fields : measurements of radio quantities, investigations on wave propagation and radio disturbances, Ursigrams, Second Polar Year, International Geophysical Year, collaboration with other scientific organizations, etc. This would extend beyond the frame of this survey which tried only to show how U.R.S.I. was born, how it spreat out and which is its structure.

* * *

It will be a pleasure for the Secretariat General of U.R.S.I. to try to give an answer to any questions on the topics included in the informative papers.

XIIth GENERAL ASSEMBLY

Resolutions and Recommendations

Resolutions and Recommendations adopted by the General Assembly on proposal of the Executive Committee, and of Commissions I, IV, V and VI, were published in *Information Bulletin*, **105**, 4-24.

COMMISSION II

ON RADIO AND TROPOSPHERE

1° *It is recommended by Commission II at the XIIth General Assembly that* :

(*a*) The extent of the dependence of scattered signals on latitude, climate and terrain should be further studied by means of observation in differing geographical areas.

(*b*) In particular, measurements of field strengths from high-power transmitters should be made at great distances and for various frequencies, polarization, antenna heights and gains, and various types of terrain. Use of aircraft in such measurements is recommended.

(*c*) Propagation studies should be extended to include investigation of pulse distortion, phase stability, fading rates, and diversity properties of the signal.

(*d*) Simultaneous meteorological measurements designed to improve understanding of the propagation mechanism are desirable.

(*e*) Quantative knowledge of the means of relating the above findings to practical radio results should be extended, especially in the direction of providing satisfactory approximations.

2° In view of the importance of conditions in the lower atmosphere to the propagation of the shorter radio waves, it is recommended that U.R.S.I. take steps to insure that national meteorological authorities are aware of the need of radio scientists for

meteorological observations ; and that such observations should be organized so as to provide as much information as possible for application in the radio field. It is recommended that national meteorological authorities should be encouraged to :

(*a*) Perform more detailed meteorological measurements, including those with airborne equipment, with emphasis on the study of the fine structure of the atmosphere. Special attention should be given to the detailed variation of the refractive index in the region where this index undergoes significant changes. The use of the refractometer for such measurements is strongly recommended.

(*b*) Complete meteorological data of the nature described under (*a*) for the purpose of using these data as a help in prediction, on a statistical basis, of the propagation characteristics to be expected in various geographical regions.

3º It is recommended that, whenever possible, meteorological measurements of a sufficiently detailed character to throw light on the mechanism of propagation, be carried out in conjunction with programms of propagation measurements. It is suggested that several varieties of atmospheric phenomena and methods of study are directly or indirectly germane to tropospheric radio propagation ; hence, multi-purpose meteorological and radio signal measuring programms are recommended as mutually beneficial and economic.

4º It is recommended that the mathematical problem of the propagation of electromagnetic waves in an inhomogeneous medium with a refractive index which is a function of the height above a spherical earth, be further investigated with a view to determining the fields transmitted around the earth. The mathematical investigation should in particular, seen better knowledge of the eigen values which belong to the various modes, and a better determination of the height gain functions. Alternatively any other method which permits the determination of the fields exactly or with an estimate of the error, should be pursued.

5º Commission II, in noting the C.C.I.R. Questions nº 101, 136, 137 and 138, and the Study Programms nº 55, 57, 79, 90 and 91 reports that more than two thirds of its sessions at the XII General Assembly were devoted to active discussion of work relating

directly to these subjects from many different organizations. It is clear that useful results are being achieved, and will be communicated to C.C.I.R. by various administrations before the next Plenary Meeting.

6° Commission II concurs unanimously with the following statement of purpose of the joint Commission on Radio Meteorology as formulated at its meeting of August 16, 1957 : that the 1957 meeting of the joint commission had provided a successful forum in which specialists in radio science, meteorology, and physics had a unique opportunity to describe their experiences and exchange knowledge about phenomena in the lower atmosphere in which they had a mutual scientific interest and the following resolutions were adopted unanimously :

(*a*) That the Joint Commission should continue as a forum with a reasonable balance of radioscientists, meteorologists, and as may be necessary other physicists, in which the radiometeorologists can exchange knowledge and experience.

(*b*) That the program for the immediate future should be :

(1) study of vertical and horizontal air movements and refractive index structure including formation of clouds and precipitation and application of the results to radio wave propagation and meteorology,

(2) study of electrical fields in the atmosphere with special reference to thunderstorms.

(*c*) That the constituent Unions be invited to review their representation on the Commission and make fresh appointments where necessary.

(*d*) That the next meeting of the Commission be held in 1960.

(*e*) That the papers for presentation at the next meeting be submitted to the President of the Commission for approval three months before the meeting.

(*f*) That the Commission wishes to convey its warmest gratitude to the President of New-York University and his staff, particularly Prof. Morris Kline for the facilities, assistance, and hospitality provided in connection with the Commission's meeting.

7° During the I.G.Y. the needs of radio scientists studying tropospheric wave propagation should continue to be met by the following program :

(*a*) Radiosonde data up to heights as high as practicable should be published in as much detail as the precision of the instrument permits. During World Meteorological Intervals the number of soundings should be at least four per day.

(*b*) It is suggested that where possible supplementary observations should be made of meteorological data at lower levels using captive balloons or masts.

(*c*) Where possible airborne microwave refractometer soundings should be made in various air masses to ascertain the characteristics of the air masses with respect to the vertical distribution of refractive index and the scale and intensity of its fluctuations.

(*d*) The attention of the meteorologists should be drawn to the refractometer as a rapid instrument for the determination of water vapor content when used in conjunction with a temperature measuring element. The refractometer soundings described in (*c*) above have a direct usefulness to the meteorologists in this regard.

COMMISSION III

ON IONOSPHERIC RADIO

The following nine Resolutions formulated by the Mixed Commission on the Ionosphere at its Meeting in New-York (August, 1957), were subsequently endorsed by U.R.S.I. at the XIIth General Assembly at Boulder.

1. *Ionospheric Current Systems* :

(i) The MCI expresses the hope that new determinations of the Sq and S_D electric current systems in the ionosphere will be made on the basis of the IGY magnetic records.

(ii) The MCI invites the International Association of Geomagnetism and Aerology (I.A.G.A.) to consider the possibility of determining the latitudes of the foci of the Sq current systems at one or more longitude on as many days as possible during the I.G.Y.

2, *Region E parameters.* — The MCI reaffirms its earlier resolutions on the need for accurate scaling and timing of region E parameters. It recommends that recordings of the E-region trace on ionograms should be made on expanded frequency scales. It further recommends that especial attention should be given to the measurement of *h'*E at stations located near the magnetic equator.

3. *Ionospheric Tidal Phenomena.* — The MCI calls attention to the need for studies during the I.G.Y. of lunar tidal oscillations in the E and sporadic E layer parameters — *h'*E, *f*E, *h'*E*s*.

4. *Height et Frequency Scales of Ionograms.* — The MCI recommends that during the I.GY.. the U.R.S.I. World Soundings Sub-Committee should be charged with the control of relative and absolute scales of height et frequency.

5. *Measurements of horizontal ionospheric movements.* — The MCI recommends that there should be the fullest co-operation between stations studying horizontal movement so that the world pattern of such motion may be elucidated.

6. *Electron density/height profiles* (*N*, *h*). — The MCI recommends that organisations which undertake the calculation of N, *h* profiles should interchange sample ionograms and the corresponding calculated profiles, so as to ensure agreement on the results obtained by different methods.

7. *Rocket investigations in Auroral latitudes.* — The MCI recommends that a more intensified small rocket programme should be carried out in auroral latitudes to study particle and other radiation at levels below 90 km.

8. *Ionospheric irregularities.* — The MCI recommends that groups observing rapidly moving ionospheric irregularities should be encouraged to continue this work and to interchange results. It is also strongly recommended that studies of all ionospheric movements should be arranged on a local or regional basis.

9. *Nomenclature.* — The MCI recommends :

(i) that the total ionisation content per unit column in that part of an ionised region below its peak be designated the « sub-peak electron content » of the region.

(ii) that the present terminology on « whistlers » (« nose-whistlers» etc.), should be regarded as tentative and that a study of a more appropriate terminology should be immediately undertaken.

(iii) that the letter A be used to designate auroral ionization resulting directly or indirectly from the entry into the earth atmosphere of solar particles : also that the subdivisions of this ionization be indicated as follows.

A*a* auroral ionisation due to primary atomic particles.

A*e* auroral ionisation due to electrons.

A*x* auroral ionisation due to X-radiation.

A*u* auroral ionisation due to ultra-violet radiation.

A*r* auroral ionisation due to photo-detachment by red radiation.

The General Assembly also adopted the following Resolutions :

10. *Proposal for Joint Study Group.* — Recognising the inter-relation that exists in the ionosphere between electro-magnetics, hydro-magnetics and fluid mechanics, Commission III recommends that encouragement be given to a Joint Study by workers in fluid mechanics and in geophysics, with a view to encouraging, on the one hand, the solution by fluid mechanics workers of unsolved problems in geophysics, and encouraging, on the other hand, the application in geophysics of established knowledge in fluid mechanics.

11. *Rocket and Satellite Experiment.* — Commission III of U.R.S.I. encourages member countries to undertake Rocket and Satellite programmes of the atmosphere and of the surrounding regions of space and urges collaboration between nations engaged in such enterprises.

12. *Analysis of I.G.Y. Data.* — If the full benefit of the I.G.Y. Programme is to be realised, it is necessary to make provision for extended studies fo the data by qualified workers. U.R.S.I. strongly urges those Government agencies which have financed the prosecution of the I.G.Y. programme now to allocate adequate funds for the purpose of supporting scientists wishing to analyse the data obtained.

13. *Symposia.* — Commission III of U.R.S.I. welcomes and endorses the proposal of the Executive Committee to hold Symposia

on special topics of radio science at approximately yearly intervals. Bearing in mind however, that most scientists and organisations working on ionospheric radio are heavily involved in I.G.Y. activities until the end of 1958, and consequently have no time to prepare such Symposia successfully, it is proposed that no Symposia on matters concerning Commission III shall be held before the middle of 1959.

14. *Theoretical Studies of Electron density/height profiles.* — Whilst recognising the great advances which have been made in the calculation of electron density/height profiles U.R.S.I. now recommends that the theoretical problem in its widest sense (including anisotropy and collision of electrons) of the determination of the distribution of ionisation with height should be further studied. It is part of this problem to specify precisely what information, measurable at the ground, is needed for the unique theoretical determination of the distribution. The general study would also be of value for further investigations of the troposphere.

15. *Sub-Commissions.* — Commission III recommends :

(i) that Sub-Commission III*a* on Ionospheric Observations and Reduction of Data, Sub-Commission III*b* on Wave Interaction, and Sub-Commission III*d* on Magneto-ionic Nomenclature be dissolved.

(ii) that Sub-Commission III*c* on Study of Propagation Time of Radio Signals continue in being under the chairmanships of Prof. Boella and with the same membership.

(iii) that a new Sub-Commission III*e* on Ionospheric Indices of Solar Activity be established under the Chairmanships of of Dr. W. J. G. Beynon and with the following membership : Dr. D. H. Menzel, M. A. H. Shapley, Professor C. W. Allen and M. C. M. Minnis.

16. *Special Report.* — Commission III recommends that a Special Report on « Radio Observations of the Aurora » be prepared by a Committee with the following membership : Dr. J. H. Chapman (*Chairman*), Professor A. C. B. Lovell, Dr. A. M. Peterson, M. Owren, Prof. H. G. Booker, Dr. Ellyett and Dr. L. Harang.

U.R.S.I.-I.G.Y. COMMITTEE

(Tentative Drafting)

1. The U.R.S.I./I.G.Y. Committee recommends that the contributions to the meeting devoted to the I.G.Y. during the morning of August 27th should be published by U.R.S.I.

2. The Committee recommends that its future constitution should be as follows :

Sir Edward Appleton (*Chairman*),
Dr. L. V. Berkner (*Vice-Chairman*).
Dr. W. J. G. Beynon (*Secretary*).
Father P. Lejay.
Prof. H. G. Booker.
Dr. W. Dieminger,
Dr. N. Fukushima,
Ing. E. Herbays,
Mr. D. Lépéchinsky,
Dr. D. F. Martyn,
Mr. M. Nicolet,
Dr. N. V. Pushkov,
Mr. J. A. Ratcliffe,
Mr. A. H. Shapley,
Dr. R. J. Slutz,
Dr. R. L. Smith-Rose.

3. *The Committee is well aware of the plans already formulated in many institutions throughout the world for the scientific elucidation of I.G.Y. radio observations by way of theoretical study. Nevertheless, in view of the vast and unique opportunity for geophysical comprehension which such observations provide, the Committee invites all bodies which sponsor scientific research to consider the possibility of instituting special I.G.Y. Fellowships and Studentships — of all ranges of seniority, from professorial downwards — for the prosecution of such theoretical research in I.G.Y. World Data Centers, universities and similar institutions on an individual or group basis.*

The Committee warmly commends the action of Unesco in instituting special studentships for the operational phase of the I.G.Y., and trusts that the same body will continue to support individual scholars, in the same way, during the post-I.G.Y. stages of scientific elucidation.

DISTRIBUTION OF U.R.S.I. PUBLICATIONS

NOTICE TO NATIONAL COMMITTEES

The distribution of the Proceedings of the XIIth General Assembly will start in a few weeks to National Committees which provided us with the information asked for by our letter nº 386 of October 5, 1957. Other Committees will have to excus us for the delay that might occur in the distribution.

NATIONAL COMMITTEES

New scale of subscription

We want to add the following National Committees to those mentioned in *Information Bulletin* n° 105 :

Czechoslovakia : category 2 (250 $).

Finland : category 1 (125 $).

Poland : category 3 (500 $).

Belgium

OFFICERS OF THE BELGIAN NATIONAL COMMITTEE

Have been appointed as officers :

President : Professor F. Dacos, University of Liège.

Vice-President : Professor J. Marique, University of Brussels.

Secretary : Professor A. Dorsimont, Ecole Royale Militaire.

Assistant Secretary : Capitaine Charles, Ecole Royale Militaire.

COMMISSIONS

Membership

The membership of Commissions I, II, IV and VII, was published in *Information Bulletin*, **105**, pp. 40-47.

We would be most thankful to be informed of any gaps or errors in the following lists.

COMMISSION II

Switzerland : W. KLEIN, Ing., Direction Générale des P. T. T., Speichergasse, 6, Berne, succeeds to Dr. GERBER.

COMMISSION III

ON IONOSPHERIC RADIO

Chairman : Dr. D. F. MARTYN, C. S. I. R. O. — Radio Research Laboratory, Camden, N. S. W., Australia.

Vice-Chairman : Dr. L. V. BERKNER, President, Associated Universities, Inc. 350, Fifth Avenue, New-York, 1, N.-Y., U. S. A.

Secretaries :

Mr. D. LÉPÉCHINSKY, Ingénieur en Chef, Bureau Ionosphérique Français, Laboratoire National de Radioélectricité, 196, rue de Paris, Bagneux (Seine), France.

Dr. W. J. G. BEYNON, Department of Physics, University College, Singleton Park, Swansea, U. K.

Australia : Dr. D. F. MARTYN.

Austria :

Belgium : Mr. M. NICOLET, Chef du Service du Rayonnement, Institut Royal Météorologique, 3, Avenue Circulaire, Uccle 1.

Canada : Mr. J. C. W. Scott, Defence Research Telecommunications, Establishment, (Radio Physics Laboratory) Defence Research Board, Shirley Bay, Ottawa, Ont.

Czechoslovaquia :

Denmark : Prof. J. Rybner, Royal Technical University, øster Voldgade, 10 G, Copenhagen K.

Finland : Prof. V. Ylöstalo, Finland's Institute of Technology, Helsinki.

France : R. P. P. Lejay, Bureau Ionosphérique Français, Laboratoire National de Radioélectricité, 196, rue de Paris, Bagneux (Seine), France.

Germany : Dr. W. Dieminger, Direktor, Institut für Ionosphärenforschung in der Max-Planck Gesellschaft, Lindau über Northeim, Hannover.

Greece :

India : S. K. Mitra, Prof. Emeritics of Physics, Head, Institute of Radio Physics Electronics, University College of Science, 92, Upper Circular Road, Calcutta, 9.

Italy : Prof. I. Ranzi, Facoltà di Fisica dell' Università, Firenze.

Japan : Professor Kenichi Maeda. Institute of Electrical Engineering, Faculty of Engineering, University of Kyoto, Sagyo-ku, Kyoto.

Morocco : Mr. A. Haubert, Institut Scientifique Chérifien, Avenue Biarnay, Rabat.

Netherlands : Dr. J. Veldkamp, Koninklijk Nederlands Meteorologisch Instituut, de Bilt.

New Zealand : Mr. J. G. Burtt, Secretary, Radio Research Committee, Dominion Physical Laboratory, Private Bag, Lower Hutt.

Norway : Dr. Leiv Harang, Norwegian Defence Research Establishment, Division of Telecommunications, Kjeller near Oslo.

Poland : Ing. S. JASINSKI, c/o Ing. Krystyn BOCHENEK, Polska Akademia Nauk, Palak Kultury i Nauk, Warsaw.

Portugal :

Spain : Prof. Dr. J. Balta ELIAS, Directeur, Instituto di Fisica « Alonso de Santa Cruz » Serrano, 123, Madrid.

Sweden : Eng. Sven GEJER, Director of Department, Royal Board of Swedish Telecommunications, Brunkebergstorg, Stockholm, 16.

Switzerland : Prof. Dr. R. MERCIER, 3, Chemin du Grey, Lausanne.

Union of South Africa : Mr. F. J. HEWITT, Director, Telecommunications Laboratory of the C.S.I.R., P. O. Box 10319, Johannesburg, Tvl.

United Kingdom : Mr. J. A. RATCLIFFE, Cavendish Laboratory, Free School Lane, Cambridge.

U. S. A. : Dr. Millett G. MORGAN, Thayer School of Engineering, Dartmouth College, Hanover, New Hampshire.

U. S. S. R. : Candidate of Technical Science N. B. Pushkov.

Yugoslavia : Prof. D. BAITCH, c/o Prof. Ing. A. DAMIANOVITCH, Faculté d'Electrotechnique, 6, Stevana Sremca, Beograd, 2.

Sub-Commissions

SUB-COMMISSION IIIc : *On Study of Propagation Time of Radio Signals.*

Chairman : Prof. M. BOELLA.

Members : P. V. ÅKERLIND,
Dr. H. Th. FLEISCHER,
Dr. W. D. GEORGE,
Prof. I. KOGA,
Sir K. S. KRISHNAN,
Father P. LEJAY,
Dr. L. R. SMITH-ROSE,
Dr. J. J. VORMER,
Dr. V. d. R. WOOLEY.

Sub-Commission IIIe : *On Ionospheric Indices of Solar Activity.*

Chairman : Dr. W. J. G. Beynon.

Members : Dr. D. H. Menzel,
Mr. A. H. Shapley,
Prof. C. W. Allen,
Mr. C. M. Minnis.

Drafting Committee of the Special Report on : « *Radar Observations of the Aurora.* »

Chairman : Dr. J. H. Chapman.

Members : Dr. H. G. Booker,
Dr. C. D. Ellyett,
Dr. L. Harang,
Prof. A. C. B. Lovell,
Dr. L. Owren.

COMMISSION V
ON RADIO-ASTRONOMY

Chairman : Prof. A. C. B. Lovell, Jodrell Bank Experimental Station, Lower Withington, Macclesfield, Ches., United Kingdom.

Vice-Chairman : Dr. J. P. Hagen, Naval Research Laboratory, Washington 25, D. C., U. S. A.

Secretaries :

Mr. R. Coutrez, Observatoire Royal de Belgique, 3, Avenue Circulaire, Uccle.

Mr. R. Hanbury-Brown, Jodrell Bank Experimental Station, Lower Withington, Macclesfield, Cheshire, England.

Members :

Australia : Dr. J. L. Pawsey, C. S. I. R. O. Radiophysics Laboratory, University Grounds, Chippendale, N. S. W.

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Canada : Mr. A. E. Covington, Microwave Section, Radio and Electrical Engineering, Division, National Research Council, Ottawa 2, Ont.

Denmark : Prof. Dr. Bengt STRØMGREN, Universitete Astronomiske Observatorium, Oster Voldgate 3, Copenhagen, K.

Finland : Prof. J. TUOMINEN, Station for Radio-Astronomy, Siltavuorenpenger, 20, Helsinki.

France : Mr. L. d'AZAMBUJA, Astronome à l'Observatoire de Meudon (Seine-et-Oise), France.

Germany : Prof. Dr. H. F. Siedentopf, Direktor, Astronomisches Institut Universität, Tübingen.

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Morocco : Prof. E. VASSY, Faculté des Sciences de Paris, Physique de l'Atmosphère, 1, Quai Branly, Paris VII.

Netherlands : Prof. Dr. M. G. J. MINNAERT, Director, The Observatory « Zonnenburg », Utrecht.

New Zealand : Mr. G. J. BURTT, Secretary, Radio Research Committee, Dominion Physical Laboratory, Private Bag, Lower Hutt.

Norway : Mr. G. ERIKSEN, Institutt for Teoretisk Astrofysikk, Universitet, Blindern near Oslo.

Spain : R. P. ROMANA-PUJO, S. J., Directeur de l'Observatoire de l'Ebre, Tortosa.

Sweden : Prof. O. RYDBECK, Research Laboratory of Electronics, Chalmers Institute of Technology, Gothenburg.

Switzerland : Prof. Dr. M. WALDMEIER, Directeur de l'Observatoire Astronomique Fédéral, Schmelzbergstrasse, 25, Zurich, 6.

United Kingdom : Prof. A. C. B. LOVELL, Jodrell Bank Bank Experimental Station, Lower Withington, Macclesfield, Cheshire.

United South Africa : Dr. F. J. HEWITT, Director, Telecommunications Research Laboratory of the C.S.I.R., P. O. Box 10319. Johannesburg, Tvl.

U. S. A. : Mr. Frederic T. HADDOCK, The Observatory, University of Michigan, Ann. Arbor. Michigan.

U. S. S. R. : Prof. V. V. VITKEVITCH, c/o Academy of Sciences, Moscow.

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German Federal Republic : Dipl. Ing. A. F. HEILMANN, Fernmeldettechnisches Zentralamt, 110, Rheinstrasse, Darmstadt.

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New Zealand : Mr. C. J. BURTT, Secretary, Radio Research Committee, Dominion Physical Laboratory, Private Bag, Lower Hutt.

Norway : Prof. M. JENSSEN, Norges Tekniske Högskole, Trondheim.

Poland : Dr. J. SEIDLER, c/o Ing. Krystyn BOCHENEK, Polska Akademia Nauk, Palac Kultury i Nauki, Warsaw.

Portugal :

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U. S. A. : Dr. J. B. WIESNER, Director, Research Laboratory of Electronics, 20 A - 122, Massachusetts Institute of Technology, Cambridge 39, Mass.

U. S. S. R. : Mr. T. STELMAKH, c/o Academy of Sciences, Moscow.

Yugoslavia : Prof. Maryan GRUDEN, c/o Prof. DAMIANOVITCH, 6, Stevana Sremca, Beograd 2.

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Dr. R. J. Slutz, National Bureau of Standards, Boulder, Colorado, U. S. A.

Dr. R. L. Smith-Rose, D. S. I. R. Radio Research Station, Ditton Park, Slough, Bucks, U. K.

Commission I

POWER MEASUREMENT AT CENTIMETRE WAVELENGTHS

The attention of all members of U.R.S.I. is drawn to Resolution 1 of Commission I (Boulder, U. S. A., 1957).

« It is strongly recommended that the national laboratories should intercompare their standards of power measurement at frequencies in the neighbourhood of 3 000 Mc/s and 10 000 Mc/s. The comparisons to be co-ordinated by Dr. R. L. Smith-Rose, Director., Radio Research Station, Ditton Park, Slough, Bucks, England. »

Facilities now exist at the Radio Research Station for carrying out such comparisons, and members willing to participate should communicate with Dr. Smith-Rose. It is suggested that the equipment most suitable for comparison experiments is some form of calibrated thermistor — or bolometer-milliwattmeter.

It would not be necessary to send any form of bridge to the Radio Research Station, but simply a calibrated waveguide mount containing the measuring element.

It should be possible to fit the mount to waveguides of the following dimensions :

(*a*) *In the* 3 000 *Mc/s band.*

External dimensions : 3 inches by 1.5 inches (7.62 cm by 3.81 cm) ; as, for example, in U. K. guide WG 10, or in U. S. guide WR 284 (or RG 48/U).

Flange connection : U. K. plain flange Z 831.560, or U. S. flange UG 53/U.

(*b*) *In the* 10 000 *Mc/s band.*

External dimensions : 1 inch by 0.5 inches (2.54 cm by 1.27 cm) ; as, for example, in U. K. guide WG 16, or in U. S. guide WR 90 (or RG 52/U).

Flange connection : U. K. plain flange Z 830.004, or U. S. flange UG 39/U.

Commission III

RADIO SIGNALS REVEAL IONOSPHERE DEPTH

(From *Telecommunications Journal*, N° 11, Nov. 1957)

Radio signals sent out over the United States Navy's powerful transmitter at Annapolis (Maryland), and picked up at Cape Horn, on the southern tip of South America, have provided startling information about the thickness of the ionosphere. Instead of extending from a height of about 50 to 200 miles, as was generally beleived, the radio signals revealed that the electrically charged particles surrounding the earth extend to a distance of at least 6000 miles and may extend as far as 20 000 miles in space.

These observations suggest that the sun's radiation to the earth, as well as the particles it constantly bombards us with, are subjected to a much heavier screening than had been believed up to now.

The findings deepen the mystery of how disturbances on the sun affect the earth's weather and upset current concepts for

explaining magnetic storms and displays of northern lights. On the other hand, they may also point to possible new ways of using outer space for the transmission of radio signals.

(Source : *Wire and Radio Communications*).

Commission VI

CONSTITUTION OF AN INTERNATIONAL ASSOCIATION OF CYBERNETICS

At 1st International Congress of Cybernetics held in Namur (Belgium), June 1956, it was decided to constitute an International Association an Cybernetics. This Association was constituted in Namur in January 1957. It already includes more than 1 000 members (of which 300 are commercial firms) representing 26 countries.

The aims of the Association are to assume a permanent and organized link between investigators who in various countries, are carrying out works relevant to the various fields of Cybernetics. It tends to promote this science and its technical applications together with the broadcasting of results reached in this field.

Further information available at the Permanent Secretariat of the Association, 13, rue Basse-Marcelle, Namur (Belgium).

2nd INTERNATIONAL CONGRESS ON CYBERNETICS

The Second International Congress on Cybernetics will be held in Namur (Belgium) on September 3-10, 1958.

The following topics will be considered : information, automation (application of cybernetics to machinery and use in the planning of work), economical and social effects, cybernetics and social sciences, cybernetics and biology. Further information available at the Secretariat of the International Association of Cybernetics, 13, rue Basse-Marcelle, Namur, Belgium.