

U. R. S. I.

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NÉCROLOGIE

Ing. A. Delouf

Nous avons le regret d'annoncer le décès de M. A. Delouf, Ingénieur des Services de la Navigation Aérienne, survenu le 21 avril 1962. Détaché au Groupe Ionosphère du Centre National d'Etudes des Télécommunications (France), M. A. Delouf a consacré, pendant de nombreuses années, son activité au Service des Ursigrammes du Centre de Bagnaux.

OBITUARY

Dr. J. I. Bohnert

We express our deepest sympathy to our colleagues of the United States National Committee for the loss of Dr. John Bohnert, who died on May 11th, 1962.

Dr. Bohnert, Superintendent of the Electronics Division of the U. S. Naval Laboratory, was a member of the U. S. National Committee of U.R.S.I. and a Fellow of the Institute of Radio Engineers. He was well known in the scientific world for his researches on solid state electronics, energy conversion, electron tubes, antennas and tropospheric propagation.

XI^e ASSEMBLÉE GÉNÉRALE

Première Annonce

Nous informons nos lecteurs que les Comités Nationaux de l'U.R.S.I. ont regu des exemplaires de la première brochure d'information relative à la XIV^e Assemblée Générale de l'U.R.S.I. qui se tiendra à Tokio du 9 au 20 septembre 1963.

Des renseignements complémentaires au sujet de cette réunion peuvent être demandés au: U.R.S.I. General Arrangement Committee, Science Council of Japan, Ueno Park, Tokyo, Japan, ou au Secrétariat Général de l'U.R.S.I.

XIth GENERAL ASSEMBLY

First Announcement

We inform our readers that U.R.S.I. National Committees have been provided with copies of the first information booklet on the XIVth General Assembly of U.R.S.I. which will be held at Tokyo, September 9-20, 1963.

Further information on this meeting may be obtained from the U.R.S.I. General Arrangements Committee, Science Council of Japan, Ueno Park, Tokyo, Japan.

Rapports des Comités Nationaux

Le compte rendu de la Réunion du Comité de Coordination publié en supplément du *Bulletin d'Information* n^o 131 donne (p. 2) des renseignements généraux sur le contenu des rapports des Comités Nationaux qui doivent parvenir au Secrétaire Général de l'U.R.S.I., en trois exemplaires, au plus tard le 1^{er} mai 1963.

Etant donné que ces rapports doivent servir de base aux rapports des Présidents des Commissions, ceux qui parviendraient au Secrétaire Général après cette date ne pourront être pris en considération par les Présidents de Commission.

L'attention des rédacteurs des Rapports des Comités Nationaux est attirée sur les Règles pour la présentation de documents scientifiques aux Assemblées Générales (Statuts et Règlements de l'U.R.S.I. (pp. 24-26) et particulièrement sur les points suivants :

1.3. Les *textes* doivent être établis dans une des langues officielles de l'U.R.S.I. (français ou anglais) ; ils doivent être dactylographiés avec *double espacement* et soigneusement revus par leurs auteurs de façon à pouvoir être reproduits ou imprimés sans nouvelle révision. Les symboles utilisés doivent être clairement expliqués et conformes aux normes scientifiques usuelles.

1.4. Les *dessins et diagrammes* (figures en traits) ne doivent contenir aucun texte sauf de brèves indications telles que figure 1, etc. Les dimensions générales ne doivent pas être inférieures à 9×12 cm ($3 \frac{1}{2}'' \times 4 \frac{1}{2}''$), ni dépasser 16×25 cm ($6 \frac{1}{2}'' \times 10''$).

Le texte qui les accompagne doit être présenté sur une feuille séparée. L'emplacement des figures doit être clairement indiqué dans la marge du texte correspondant.

Etant donné que seuls les textes originaux seront publiés, les Comités Nationaux ne sont plus invités à joindre la traduction.

Les Statuts et Règlements de l'U.R.S.I. ainsi que le Compte Rendu de la Réunion du Comité de Coordination seront envoyés à ceux qui en feront la demande au Secrétaire Général de l'U.R.S.I.

National Committee Reports

The minutes of the Meeting of the Coordinating Committee issued as supplement to the *Information Bulletin* n° 131, gives p. 12 general information on the contents of National Committee Reports of which three copies should reach the Secretary General of U.R.S.I. at the latest by May 1st 1963.

As such reports will be used by Commission Chairmen to draft the Commission Reports, National Committee Reports reaching the Secretary General after the above mentioned date will not be considered by the Commission Chairmen.

Attention of authors of National Committee Reports should be called to the Rules for the Presentation of Scientific Documents to General Assemblies (U.R.S.I. Statutes and Bylaws, pp. 24-26) and particularly to the following items.

1.3. *Texts* should be in one of U.R.S.I. official languages (French or English); they should be typewritten with *double spacing* and carefully revised by their authors so that they may be reproduced or printed without further revision. The symbols used should be clearly explained and should be in accordance with standard scientific usage.

1.4. *Drawings, Diagrams* (line-figures) should contain no text except for brief indications such as Fig. I, etc. The overall dimensions should not be less than $3'' \frac{1}{2} \times 4'' \frac{1}{2}$ (9×12 cm) nor exceeding $6'' \frac{1}{2} \times 10''$ (16×25 cm).

The accompanying text should be submitted on a separate sheet. The place of figures should be clearly indicated in the margin of the text concerned.

As only original texts will be published, National Committees are no more invited to include a translation.

U.R.S.I. Statutes and Bylaws, and the Proceedings of the meeting of the Coordinating Committee are available at the U.R.S.I. General Secretariat.

Présentation des communications individuelles

Le compte-rendu de la Réunion du Comité de Coordination publié en supplément du *Bulletin d'Information* n° 131 signale (p. 7) l'intention de publier après la prochaine Assemblée Générale des « Rapports sur les Progrès en Radio Science », un rapport serait consacré à chacune des Commissions et à chacun des Comités importants. Ces rapports contiendraient entr'autres les diverses revues sollicitées par le Président de la Commission; ces revues seront les seules communications individuelles qui seront prises en considération lors de l'Assemblée Générale.

L'attention des auteurs est attirée sur les *Instructions pour la Publication des Monographies de l'U.R.S.I.* (Statuts et Règlements de l'U.R.S.I., pp. 21-23) et particulièrement sur les règles ci-après à appliquer pour la présentation des manuscrits :

(i) Deux exemplaires du manuscrit seront envoyés au Secrétaire Général de l'U.R.S.I. Ces exemplaires devront être dactylographiés avec *double espace* et soigneusement revus par leurs auteurs de façon à pouvoir être imprimés sans nouvelle revision.

(ii) Les symboles utilisés doivent être clairement expliqués et conformes aux normes scientifiques usuelles.

(iii) *Références.* — Quel que soit le système utilisé, il doit être suivi de façon uniforme pour tout le manuscrit. Le système suivant a les préférences de l'éditeur :

pour les périodiques : T. KUWANA et R. N. ADAMS, *Anal. Rad. Acta*, 20 (1959) 51. (Auteur - virgule - titre abrégé du périodique suivant les règles normales - virgule - numéro du volume - année entre parenthèses - numéro de la page - point final).

pour les livres : B. JIRGENSONS, *Antennes Radioélectriques*, Edition Universelle, Paris, 1958, p. 656. (Auteur - virgule - titre du livre - virgule - année - virgule - numéro de la ou des pages, p. ou pp. - point final).

Dans les listes alphabétiques, les initiales du premier auteur seront données après son nom.

Il convient de s'assurer que chaque numéro de référence dans le texte ait une mention qui lui corresponde dans la liste des références et vice versa.

(iv) Les dessins et diagrammes (figures linéaires) ne doivent contenir aucun texte sauf de brèves indications telles que fig. 1 etc. Les dimensions totales ne doivent pas être inférieures à 9×12 cm ($3''\frac{1}{2} \times 4''\frac{1}{2}$) et ne doivent pas dépasser 16×25 cm ($6''\frac{1}{2} \times 10''$).

Les photographies doivent être bien nettes et reproduites sur du papier glacé, à l'exclusion de photographies en demi-tons déjà imprimées dans un livre ou un journal, etc.

Le texte accompagnant les figures sera présenté sur une feuille séparée. L'emplacement des figures sera indiqué clairement dans la marge du texte s'y rapportant.

(v) Pour les comptes rendus de symposia et de réunions, seules seront acceptées les communications individuelles originales se rapportant au sujet du symposium ou à des points figurant à l'ordre du jour de la réunion, et émanant d'auteurs assistant à la réunion.

(vi) Les communications individuelles pour ces comptes rendus seront limitées à 2000-3000 — exceptionnellement à 4000 — mots et trois feuilles d'illustrations; elles seront accompagnées d'un résumé de 100 à 200 mots (si possible, dans la langue officielle non utilisée pour la rédaction du texte).

Les Statuts et Règlement de l'U.R.S.I. ainsi que le Compte Rendu de la Réunion du Comité de Coordination seront envoyés à ceux qui en feront la demande au Secrétaire Général de l'U.R.S.I.

Submission of individual papers

The Proceedings of the Meeting of the Coordinating Committee published as supplement to *Information Bulletin* n° 131, mentions (p. 17) the intention to proceed to the publication after the forthcoming General Assembly of « Reports on Progress in Radio Science », a report should be devoted to each Commission and outstanding Committee. Such reports should include *inter alia* the various review papers invited by the Commission Chairman; such review papers will be the only individual papers that will be considered at the General Assembly.

The attention of the authors is drawn to the *Instructions for the Publication of U.R.S.I. Monographs* (U.R.S.I. Statutes and Bylaws, pp. 21-23) and particularly to the following rules for the presentation of manuscripts.

(i) Two copies of the manuscript should be sent to the Secretary General of U.R.S.I. Such copies should be typewritten with *double spacing* and carefully revised by their authors so that they may be printed without further revision.

(ii) The *symbols* used should be clearly explained and in accordance with standard scientific usage.

(iii) *Citations to literature.* Whatever system is employed, it should be carried out uniformly throughout the entire manuscript. The following system is preferred by the publisher :

to periodicals : T. KUWANA and R. N. ADAMS, *Anal. Rad. Acta*, 20 (1959), 51. (Author - comma - periodical abbreviated according to standard rules - comma - volume number - year in brackets - page number - full stop).

to books : B. JIRGENSONS, Radio Antennas, General Publisher, New York, 1958, p. 656. (Author - comma - title of book - comma - publisher - comma - publisher's residence - comma - year - comma - p. or pp. - page number (s) - full stop).

In alphabetical lists, the initials of the first author should be given after his surname.

Be sure that every reference number in the text has its corresponding quotation in the list references, and vice versa.

Titles of journals, as far as possible, be abbreviated.

(iv) Drawings, diagrams (line-figures) should contain no text except for brief indication such as Fig. 1, etc. The overall dimensions should not be less than 9×12 cm ($3''\frac{1}{2} \times 4''\frac{1}{2}$) nor exceeding 16×25 cm ($6''\frac{1}{2} \times 10''$).

Glossy sharp photographs should be provided ; no half-tones already printed in a book, journal, etc.

The accompanying text should be submitted on a separate sheet. The place of figures should be clearly indicated in the margin of the text concerned.

(v) In proceedings of Symposia or Meetings only original individual papers referring to the subject of the Symposium or to items on the agenda of the Meeting and whose author is present at the meeting should be accepted.

(vi) Individual papers for such Proceedings should be limited in length to 2000-3000 — exceptionally to 4000 — words and three sheets of illustrations, they should be accompanied by 100-200 words abstracts (if possible in the official language not used 'or the original text).

U.R.S.I. Statutes and Bylaws and the Proceedings of the Meeting of the Coordinating Committee are available at the U.R.S.I. General Secretariat.

NATIONAL COMMITTEES

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MEMBERSHIP

- Dr. J. T. HENDERSON, *Chairman*, Division of Applied Physics, National Research Council, Ottawa 2, Ontario.
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Dr. P. M. MILLMAN, *Secretary*, Radio and Electrical Engineering Division, National Research Council, Ottawa 2, Ontario.

Czechoslovakia

IONOSPHERIC MEASUREMENTS

The Geofysikalni Ustav Ceskoslovenske Akademie Ved, Praha 4, Sporilov, Bocni 11, cp 1401, has issued « Results of Geomagnetic Earth Current and Ionospheric Measurements made at the Observatories of Pruhonice, Budkov and Panska Ves in 1959 ».

India

RESEARCH REPORT

The Institute of Radio Physics and Electronics, University of Calcutta, has issued the *Research Report* for 1959-60 (Vol. XII).

The ionospheric investigations as described in the report form part of the programme of the Radio Research Committee (India National Committee for U.R.S.I.).

Besides a Foreword and an Introduction, the Report contains the following papers :

Ionosphere.

Gyro-Frequency in the Ionospheric Regions, S. DATTA and R. N. DATTA.
Early Morning F2 Layer and evidence of pre-sunrise F-layer splitting,
P. BANDYOPADHYAY.

Ionospheric observations on the F-region during the solar eclipse of 19 April 1958, S. DATTA, P. BANDYOPADHYAY and R. N. DATTA.

On the F2 region of the Ionosphere, S. DATTA.

Electron Tubes and Transistors.

Physical interpretation of measurements on transistors, S. DEB and A. N. DAW.

Molecular and allied devices for generation and amplification of micro-waves, S. DEB and A. N. DAW.

Determination of physical parameters and geometry of a junction transistor, S. DEB and A. N. DAW.

Variation of input conductance of a grounded base junction transistor, S. DEB and J. K. SEN.

On the variation of transport factor of a junction transistor with injected carrier concentration, A. N. DAW.

Electric Discharge.

Increase in breakdown potential of a gas in electrodeless discharge in presence of a transverse magnetic field and the concept of equivalent pressure, S. N. GOSWAMI.

Electron temperature in electrodeless discharge subjected to a transverse magnetic field, S. N. GOSWAMI.

Switching Circuits.

Application of Boolean Algebra to the design of switching circuits, A. K. CHOUDHURY.

Nonlinear Circuitry.

Ultraharmonic and subharmonic resonance in an oscillator, B. R. NAG.

Locking range of an oscillator for different non-linearities, B. R. NAG.

Servomechanism.

Some studies on the effects of limiting in a position control servo containing backlash, A. K. MAHALANABIS.

A describing function study of hysteresis in a velocity lag servomechanism, A. K. MAHALANABIS.

United Kingdom

A NEW INFORMATION BULLETIN

We inform our readers that the Royal Society has issued the first issue of the *Bulletin of the Royal Society International Scientific Information Service*.

The aims of this Bulletin are given in the following Preface by Sir Patrick Linstead, Foreign Secretary, Royal Society.

Preface

The Royal Society has established a special library for the publications of the International Council of Scientific Unions, International Scientific Unions, Commissions, Special Committees

and Permanent Services. Certain other publications of international scientific importance, and not readily available elsewhere, are also being included such as those of U.N.E.S.C.O. on the Arid Zone, Humid Tropics and Marine Sciences. With this library as a basis it is planned to provide an information service so that better use might be made in the United Kingdom of the international contacts of the Royal Society. These scientific publications are not as widely known as they deserve to be; and it has also been difficult for British scientists to refer to such material.

This present Bulletin is the first issue of a series which it is proposed to publish regularly. This issue contains complete lists of the holdings of the library. Future issues will keep this catalogue up-to-date. The Bulletin will be given wide circulation, particularly among British scientists. I hope that in this way it will help scientists to keep in touch with international developments.

The classifications in the list of holdings will be seen not to be uniform. This is because the systems used by those unions and associations which produce lists have been retained. This should make for ease of reference and comparison. I hope that readers in a position to do so will help to make good any deficiencies in the holdings. Publications are listed under the publishing body and not under subjects.

Several organizations already publish lists of forthcoming conferences and symposia. These are usually not complete regarding I.C.S.U. meetings, so schedules of such future meetings will be included.

It is also proposed that occasional articles on international scientific affairs and notes on exchanges, visits, grants and similar matters should be included.

Beside the Preface, the first issue contains an informative paper on the International Council of Scientific Unions and a catalogue of the Royal Society special library for international scientific publications.

COMMISSIONS AND COMMITTEES

Australia

LIST OF OFFICIAL MEMBERS

- Commission I : Mr. F. J. LEHANY, Chief, C.S.I.R.O. Division of Applied Physics, University Grounds, Sydney, N. S. W.
- Commission II : Mr. L. M. HARRIS, P. M. G. Research Laboratories, 59, Little Collins Street, Melbourne, Victoria.
- Commission III : Prof. G. R. ELLIS, Physics Department, University of Hobart, Hobart, Tasmania.
- Commission IV : Prof. H. C. WEBSTER, Physics Department, University of Queensland, St. Lucia, Brisbane, Queensland.
- Commission V : Prof. W. N. CHRISTIANSEN, School of Electrical Engineering, University of Sydney, Sydney, N. S. W.
- Commission VI : Mr. B. F. C. COOPER, C.S.I.R.O., Division of Radiophysics, University Grounds, Sydney, N. S. W.
- Commission VII : Associate Prof. R. E. AITCHISON, School of Electrical Engineering, The University of Sydney Sydney, N. S. W.
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Canada

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- Commission I : Dr. J. T. HENDERSON, Division of Applied Physics, National Research Council, Ottawa 2, Ontario.
- Commission II : Dr. D. R. HAY, Physics Department, University of Western Ontario, London, Ontario.
- Commission III : Dr. J. H. CHAPMAN, Defence Research Telecommunications Laboratory, Defence Research Board, Ottawa, Ontario.

Commission IV : Dr. C. O. HINES, Defence Research Telecommunications Laboratory, Defence Research Board, Ottawa, Ontario.

Commission V : Dr. G. A. HARROWER, Physics Department, Queen's University, Kingston, Ontario.

Commission VI : Dr. M. P. BACHYNSKI, Research Laboratories, RCA Victor Company Ltd, Montreal, Quebec.

Commission VII : Prof. R. E. BURGESS, Department of Physics, University of British Columbia, Vancouver, B. C.

Commission I

On Radio Standards and Measurements

INTERCOMPARISON OF RF POWER STANDARDS AT 300 Mc/s (U. S. A.-U. K.)

by Dr. L. ESSEN, *Chairman U. K. Commission I*

Following the XIIIth General Assembly of the International Scientific Radio Union (U.R.S.I.), the United States National Bureau of Standards, Boulder Laboratories and the Radio Research Station, Department of Scientific and Industrial Research, completed plans for the intercomparison of RF Power Standards. The frequency was chosen to be 300 Mc/s at power levels in the range 1 milliwatt to 1 watt.

A portable working standard (1) was constructed and calibrated at NBS. It consisted of a 50-ohm distributed-constant directional coupler and two vacuum thermoelement detectors each matched to 50 ohms. One of the detectors was connected to the incident arm of the coupler secondary line and the open-circuit dc output from the detector (in absolute volts) was given in terms of RF power at the load arm of the coupler primary line. The primary line was terminated in a 50-ohm resistive load.

Calibration of the U. S. working standard was accomplished with the U. S. National Reference Standards consisting of two thermistor bridges and 0.05 to 5 watt, dry static calorimeter. The calibrated range extended from approximately 50 mW to

580 mW with particular attention to the calibration at the 100 mW level. The uncertainty in the calibration was $\pm 0.5\%$.

In the United Kingdom the U. S. working standard was compared with two independent standards, a thermionic diode wattmeter (2) and a thermistor mount with associated dc bridge and directional coupler. The thermionic diode was designed to measure the voltage across a non-reactive 50-ohm load. The diode operated in the negative voltage or «exponential» region. Both instruments were developed by the Electrical Inspection Directorate Laboratories of the British Ministry of Aviation.

A summary of the results of the intercomparison is as follows :

A. Comparison with Thermionic Diode Wattmeter.

NBS Mount	Power Range mW	Average Difference Percent
No. 1	50 to 400 (7 levels)	+0.19
	100	+0.50
No. 2	50 to 400 (8 levels)	+0.27
	100	+0.30

B. Comparison With Thermistor Mount.

NBS Mount	Power Range mW	Average Difference Percent
No. 1	50 to 400 (8 levels)	-0.24
	100	+0.20
No. 2	100	+0.20

A plus indicates that the U. S. was high compared to U. K.

The results are very encouraging and give greater confidence in standards and techniques for *rf* power measurement.

The working standard has been returned to the United States and NBS desires intercomparison with other countries (3) at 300 Mc/s, or a similar instrument for use at 1000 Mc/s can be prepared.

REFERENCES

1. P. A. HUDSON. — A Precision RF Power Transfer Standard. *IRE transactions on Instrumentation*, Vol. 1-9, Nr. 2, Sept. 1960, p. 280-5.
2. I. A. HARRIS. — Transit-time and other Effects in a Valve-Voltmeter working at Extremely Low Currents. *J. Brit. I.R.E.* (in course of publication).
3. Proceedings of the XIII General Assembly, U.R.S.I. Volume XII, Part 1, Commission I on Radio Standards and Measurements Methods, p. 75-87.

Commission III. — On Ionospheric Radio

I.G.Y. IONOSPHERIC DATA

The following Volumes of the Annals of the International Geophysical Year containing Tables of I.G.Y. Monthly Median Ionosphere Data have been issued (The contents of preceding volumes have been published in *Information Bulletin* n° 127 and 128).

Vol. XVII

Adak	Byrd Station
Alert	Calcutta
Baguio	Campbell Island
Bangui	Canberra
Base Roi Baudouin	Cape Canaveral
Belgrano	Cape Hallett
Beograd	Casablanca
Bogota	Chiclayo
Bombay	Clyde
Brisbane	Concepcion
Buenos Aires	

Vol. XVIII

Dakar	Fort Chimo
Decepcion	Fort Norman
Delhi	Frobisher
Djibouti	Godhavn
Dourbes	Godley (Christchurch)
El Cerillo	Hobart
Eureka	Hollandia

Ibadan	Marion Island
Kerguelen (Port-aux-Français)	Mawson
La Paz	Meanook
La Quiaia	Monte Capellino
Lindau	Narsarssuak
Lwiro (Katanga)	Natal
Macquarie Island	Ottawa
Madras	

Vol. XIX

Paramaribo	Tananarive (Ivato)
Poitiers	Terre Adélie
Pole Station	Tiruchirapalli
Rabat	Toronsville
Rarotonga	Trelew
Resolute Bay	Trivandrum
Reykjavik	Tsumeb
St John's	Tucumán
Sao Paulo	Ushuaia
Scott Base	Watheroo
Tananarive	Wilkes
Tehiti (Orstom)	Winnipeg
Tamanrasset	Yellow Knife

**ATLAS OF FOURIER COEFFICIENTS
OF DIURNAL VARIATION OF foF2**

The National Bureau of Standards has issued in the series of Technical Notes the «Atlas of Fourier Coefficients of Diurnal Variation of foF2» by William B. Jones.

In this publication a series of graphical representations is given for illustrating the regular and continuous geographic variations of Fourier coefficients a_j and b_j obtained from the diurnal analysis for foF2 monthly medians, including their main latitudinal trend, mixed latitudinal and longitudinal variation, and the effect due to noise (random fluctuation in the original data). To illustrate the systematic changes in these variations with seasons and with solar activity, corresponding graphs are given for four seasonal months for minimum and maximum years of solar activity (1954 and 1958).

DOCUMENTATION

L'attention des membres de la Commission III est attirée sur les articles suivants :

- « Etude comparative des prédictions de la MUF », par M. JOACHIM, C.C.I.R., *Journal des Télécommunications*, Vol. 29, n° 8 (août 1962), pp. 239-246.
- « Propagation ionosphérique en ondes longues et moyennes. Résultats des travaux entrepris par l'Union Européenne de Radiodiffusion (Deuxième Partie) », par W. EBERT, *Revue de l'U. E. R.*, n° 72-A Technique (avril 1962).
- « Propagation ionosphérique en ondes longues et moyennes. Résultats des travaux entrepris par l'Union Européenne de Radiodiffusion (Troisième Partie) », par W. EBERT, *Revue de l'U. E. R.*, n° 73-A Technique (juin 1962).

BIBLIOGRAPHY

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Comité pour les Recherches Radioélectriques dans l'Espace

BIBLIOGRAPHIE

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Space Radio Research Committee

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Attention of the readers should be called to a paper published in the *Telecommunication Journal*, Vol. 29, n° 7 (July 1962), pp. 215-220, « Deep Space Communications », by E. RECHTIN, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California.

PERMANENT SERVICES

I.U.W.D.S.

Meeting of the European Regional Committee on Ursigrams
(E. R. C. U.)

held in London, at the Royal Society, on June 8th, 1962

MINUTES ⁽¹⁾

Were present :

- *at the morning session* : Dr. SMITH-ROSE (U. K., *Chairman*, E.R.C.U.); Dr. BECKMANN (Germany); R. P. CARDUS (Spain); Dr. GEJER (Sweden); Dr. MICHARD (representing Dr. DENISSE, France); Mr. de FEITER (Netherlands, *Secretary* I.U.W.D.S.); and Prof. COUTREZ (Belgium, *Secretary* E.R.C.U.). Attended part of the session : Mr. SHAPLEY.
- *at the afternoon session* : the same, with Mr. DREYFUS (C.O.P.E.R.S.); Mr. LEGRAND (S.P.A.R.M.O.); and Mr. SHAPLEY (I.Q.S.Y., Spacewarn). Excused : Mr. D'OPORTO (Eire); Dr. EHMERT (*Chairman* S.P.A.R.M.O.).

The Meeting opened at 09.30 under the *chairmanship* of Dr. SMITH-ROSE.

⁽¹⁾ LIST OF ABBREVIATIONS :

- C.C.U. — Central Committee on Ursigrams.
- E.R.C.U. — European Regional Committee on Ursigrams.
- I.Q.S.Y. — International Quiet Sun Year.
- S.P.A.R.M.O. — Solar Particle Altitude Radiation Monitoring Organization.
- E.S.R.O. — European Space Research Organization.
- E.L.D.O. — European Launching and Development Organization.
- C.O.P.E.R.S. — Preparatory Committee for European Space Research Organization.
- I.W.D.S. — International World Days Service.
- I.U.W.D.S. — International Ursigram and World Days Service.

Morning Session

Preliminary,

(a) On written proposal of Dr. Denisse, E.R.C.U. decided to appoint Dr. Michard as representative of France in the European Committee. The Meeting addressed unanimous thanks to Dr. Denisse for his active collaboration.

(b) The Draft Agenda is approved (Appendix I). It is decided to welcome co-operation with I.Q.S.Y., E.S.R.O. and S.P.A.R.M.O., and to discuss the principles and modalities of this co-operation with the invited representatives of these organizations at the afternoon meeting.

1. — FUNCTIONING OF THE SERVICE

Relations with C.C.U., resolutions of Kyoto meeting, fusion of the Ursigram Service with the I.W.D.S.

Items relevant to E.R.C.U. in the Kyoto minutes (*Information Bulletin*, n° 130, 1962) were considered. After some discussion on the combination of the Ursigram Service with I.W.D.S. to form one single body, the I.U.W.D.S., it is decided to agree with this combination, with the type of representation given in Res. 4, I, Par. 2 of Kyoto minutes and to reach the following resolution :

Resolution I :

« Considering

- (a) Resolutions I and II of E.R.C.U., reached in Brussels on May 6-7, 1958 (*U.R.S.I. Information Bulletin*, n° 109, 1958),
- (b) Resolution of E.R.C.U., reached in Brussels on January 28-29, 1960 (*U.R.S.I. Information Bulletin*, n° 119, 1960),
- (c) the minutes of the C.C.U.-I.W.D.S. meeting held in Kyoto on September 8-11, 1961 (*U.R.S.I. Information Bulletin*, n° 130, 1962).

The European Regional Committee on Ursigrams, unanimously :

- (a) *agrees* on the merging of the Ursigram Service and the I.W.D. Service into a single body, the I.U.W.D.S.,
- (b) *confirms* Resolutions I and II, of May 6-7, 1958, on its functioning and relations with C.C.U. and extends Resolution II to its relations with the new I.U.W.D.S. Steering Committee,

- (c) *confirms* Resolution I of January 1960 on the agreement of draft terms of reference for regional groups of Ursigrams,
- (d) *agrees* on the principle that Regional Committees on Ursigrams will be represented in the new I.U.W.D.S. Steering Committee in the same way they were represented in C.C.U.»

2. — FUNCTIONING OF THE EUROPEAN NETWORK (CENTRES AND STATIONS)

2.1. — *Centres*

Activities of the three European Ursigram centres (Darmstadt, Nera, Paris) consist in data collection, dissemination by broadcast, telephone-telex or mail, and distribution of alerts. They are summarized as follows :

Darmstadt : broadcast : every data, telex : only priority data,
mail : complete messages.

Nera : no broadcast, telex : priority data, mail : complete messages
once a day.

Paris : broadcast : all data, mail : exceptionally on demand.

It was decided to prepare lists of activities, to be appended to the minutes (see appendix II *a* and *b*), and to be published in the *U.R.S.I. Information Bulletin*.

Considering the needs expressed by users, the resolutions reached by international european agencies as C.O.P.E.R.S., S.P.A.R.M.O., the opinions of other Ursigram networks and of the representatives of I.Q.S.Y. and C.C.U., it appeared clearly that there is a strong necessity that Ursigram centres in Europe maintain a full time coverage (ordinarily the centres are closed on Sundays and do not work on a 24 h basis).

The means to reach this optimum condition were investigated : it appeared that one centre has to take the responsibility, if relay would not work. Consequently, the meeting took the following resolution :

Resolution II :

« Considering the development of European and extra-European agencies, and bearing in mind the expected large increase in demands in the next few years, the European Regional Committee

on Ursigrams strongly feels that full time coverage will greatly improve the potentialities of the Ursigram network, and urges the European centres in Darmstadt, Nera and Paris to take steps so that a coverage on the basis of 7 days a week (including Sundays) and 24 h a day be effective as soon as possible. »

2.2. — *Interchange of data and priority list*

Owing to the reduction of solar activity in the next years and the interest to include in Ursigrams new data as plage indices, sudden disappearances of filaments, etc, the meeting agreed on some amendments to the priority list of messages (*Information Bulletin* 119, 1960, pp. 55-56). It was felt that this kind of data could be included in the item « solar chromosphere »; as a consequence, first priority should be given to this item. Finally, the meeting agreed on the following resolution :

Resolution III :

« It is resolved that, for the purpose of Ursigram procedure and economy of transmission, scientific observations in the following disciplines should have a priority in the order given, beginning with the most important :

- (a) *first priority* : Solar flares, Radio solar bursts (especially type IV), Sudden ionospheric disturbances, Ionospheric absorption (especially type III), Solar corona (yellow line 5694), Localization of solar radio sources, Solar chromosphere.
- (b) *second priority* : Ionospheric propagation quality figures, Ionospheric predictions and critical frequencies, Geomagnetic outstanding occurrences, Geomagnetic K indices, Solar corona (green line 5303), Cosmic rays, Sunspots, Solar flare patrol hours, Aurorae, Whistlers, Seismology.

It is resolved that this list be considered as a minimum. In this respect, it is recommended to broadcast at least first priority data, the other being sent by mail. It is recommended that arrangements be made between centres and observatories for the purpose of broadcasting. »

2.3. — *Functioning of the network*

Some demands had been expressed by Dr. Beckmann : flares from Tokyo (could be sent to Darmstadt by Nera) ; riometer observations from Norway and Spitzberg (steps will be taken by Dr. Gejer to provide the results) ; long wave transmissions on 60 and 80 kc/s, giving similar information as riometer (as Sweden receives Rugby in Kiruna, the question was referred to Dr. Gejer ; eventually a special code could be established). The question of Cosmic ray measurements in Kiruna was raised by Dr. Gejer. Father Cardus said also that Spain will apply to Paris for transmission. Other questions will be considered by correspondence, either through the Secretary or directly, the Secretary being kept informed.

For what concerns Spacewarn-Spacetrack messages, whose length is such that they are not telexed by Darmstadt but sent by mail, it was understood that, as they do not normally belong to the U.R.S.I. field of activity, there is no obligation to distribute them except in case of special arrangements. Simplification of such messages was recommended by the meeting.

The question of alert warnings was considered. The functioning of the Paris centre which could distribute in plain language alert warnings on the basis of cm wavelengths (Solar radio flux (3-10 cm)) was described by Dr. Michard. The centres in Darmstadt and Nera could also give similar warnings. The signification of Advance alerts and of Geoalerts was precised by Mr. Shapley. There may be a certain interest to specify that « alerts » mean « solar activity » and that « SWI » mean « prediction ». They are essentially advisory in character.

Some discussion about data centres took place. Though E.R.C.U. is in a position to handle E.S.R.O. data provided some kind of convention is reached between the two organisms, it was not found inconvenient to separate E.S.R.O. and Ursigrams centres as they have different kinds of activities.

3. — SUGGESTIONS FOR NEW CODES

It was agreed to deal with the question by correspondence with the Secretary of E.R.C.U. Interchange codes will be dealt with by the Secretary of I.U.W.D.S.

The morning session was closed at 12.30.

Afternoon Session

The session opened at 14.30 under the chairmanship of Dr. Smith-Rose.

1. — PREVISIONS FOR I.Q.S.Y.

As no definitive I.Q.S.Y. programme has been set up to date (June 1962), items relevant to E.R.C.U. activities are still to be considered as preliminary. The Secretary will examine the final documents in order to facilitate the task of the E.R.C.U.

The I.Q.S.Y. project (under C.I.G.) was described by the Reporter for World Days, Mr. Shapley (see Report on 1st I.Q.S.Y. meeting in CIR 1383 (C.I.G.), 20.3.62 (200); see also Report of meeting of U.R.S.I.-C.I.G. Committee, Dec. 16, 1961, in Nice). Items relevant to E.R.C.U. activities in CIR 1383 may be summarized as follows :

- I.Q.S.Y. alerts and warnings, rapid dissemination of data,
- World day programmes,
- I.Q.S.Y. Calendar,
- Daily solar index from 10 cm. solar radio flux,
- Geomagnetism,
- Aurorae,
- Ionosphere,
- Solar activity,
- Cosmic rays.

The present WD programme will serve for I.Q.S.Y., with the addition of quiet geomagnetic and ionospheric conditions. There are special ionospheric programmes for R.W.D. There is interest in post facto declaration, including solar conditions. For what concerns solar data, rapid interchange is important but the criteria should be adapted to the change in solar cycle. Cosmic rays rockets or balloon days may be decided but the question is in a preliminary state. Data needed for geomagnetism will be precised in the W.D. programme as during I.G.Y. : alerts and S.W.I. will be used. Coordination between centres and observatories should be improved for rapid dissemination of data.

As coherent data on 10 cm solar radio flux already exist, one could probably do better than to give preliminary values so that

the remaining problem is only one of rapid reduction of records and dissemination of results.

I.Q.S.Y. calendar will be prepared along the same lines as I.W.D.S. calendar. Retrospective calendar is also of great interest but is a matter of coordination between centres instead of a matter of disciplines or of world warning agency.

Calendar will be ready in 1963 for I.Q.S.Y. S.W.I. should be considered as informative, and reasons should be given in case they were fructuous or unfructuous.

Some discussions on various items as aurorae, heating in the upper atmosphere due to solar flares, infrasonic sounds from the outer atmosphere took also place.

2. — RELATIONS WITH E.S.R.O. AND SPACEWARN NETWORK

2.1. — *Cooperation with European Space Research Organizations*

The situation of C.O.P.E.R.S., E.S.R.O., E.L.D.O. was described by Mr. Dreytus.

C.O.P.E.R.S. : the preparatory Committee for European Space Research Organization, will continue its activity until February 1963 (unless the treaty between nations is ratified before) and will be replaced by E.S.R.O. (European Space Research Organization). The C.O.P.E.R.S. report has been made public. The programme includes *sounding rockets* during 5 years (not more than 10 on the first year, 65 in the 5th year); *small satellites* (50-100 kg, 250 miles range, 6-8 in number beginning in 1965), *launching of stabilized platform and peri-lunar satellite* (long term programme).

The E.S.R.O. headquarters will be in Paris. Technical studies will be made in Delft. Data handling will be effected in Darmstadt. Launching will take place at Kiruna. Research laboratories will be made available in Italy. No decision are already reached for tracking stations or concerning the type of sounding rockets.

Another organization, E.L.D.O. (European Launching and Development Organization) has been established, grouping 6 European countries plus Australia. E.S.R.O. will be the main customer of E.L.D.O., which also will handle more commercial problems as TV or communication satellites.

Discussions at C.O.P.E.R.S. in Paris showed the great interest of Ursigrans messages for such space organization. Res. 4.4.3 in

C.O.P.E.R.S./G.T.S.T./23, p. 93 is as follows (E.S.D.a.C. is European Space Data Centre, in Darmstadt).

« Among the existing organizations with which E.S.D.a.C. should cooperate, special mention should be made of the Ursigram Service which is a fast distribution system of Solar-Geophysical data and also of information about satellites. It is felt that the Ursigram Service would not fulfil exactly the needs of E.S.D.a.C. However, in accordance with Res. 19 of the Central Committee on Ursigrams (Bruxelles 14-15 May, 1959) and of par. 6 of the report of the joint meeting of the C.C.U. (London 12 Sept. 1960) it appears that Ursigram channels might be used to establish or improve links between the E.S.R.O. network and the non-european networks.

Details on this cooperation should be worked out after E.S.R.O.'s coming into existence by an E.S.R.O. ad hoc working group together with the European Regional Committee on Ursigrams ».

Mr. Dreyfus mentioned that sounding rocket observers want to be included in the network, and that an information network between centres (5 in principle) will be established on the same basis as the Euratom system (Electronic memory plus teletypes). To maintain contacts with Ursigrams, an ad hoc group has been formed under the chairmanship of Dr. Janssens (C.G.R.G.B.).

In subsequent discussion, it was agreed by E.S.R.O. to cooperate with C.O.P.E.R.S. Dr. Smith-Rose will lead the contacts.

2.2.— *Cooperation with Spacewarn network*

Activities of Spacewarn were described by Mr. Shapley. In the Ursigram system, messages on rocket and satellite experiments are since 2 years sent in the network called Spacewarn to distinguish it from the Solar-Geophysical network. Messages consist in launching announcements, tracking observations and elements of satellite orbits. National contacts for collection and dissemination of data were described. A report has been made but not published. There exists a code booklet, distributed in the last C.O.S.P.A.R. meeting, containing a list of tracking stations (March 1962, reproduced at C.R.P.L. and submitted for publication in the *C.O.S.P.A.R. Information Bulletin*). After the combination of Ursigrams with I.W.D.S. into I.U.W.D.S., the opinion of

E.R.C.U. on Spacewarn activities will be much appreciated and valuable. It is remarked by the reporter that Spacewarn activities will never have the amplitude of similar activities in U. S. S. R., U. S. A. and E. S. R. O., and that a single European warning centre for Spacewarn might be preferred (for example Nera).

At the intervention of Dr. Gejer, some discussion took place on the relationships between E.S.R.O. and U.N.O. It was remarked by Dr. Michard that U.N.O. has nominated two committees for space research, namely (a) on sciences and techniques, (b) on juridical points of view. The first committee has nominated 3 subcommittees (a) to recommend a guide for dissemination of data by the secretariat, (b) to consider recommendations on the problems of data centers and Spacewarn resolutions, (c) to consider recommendations for publication of technical data as telemetry, etc. At the first working group meeting, it was decided to refer the question to C.O.S.P.A.R.

On a question concerning a similar working group in I.T.U., raised by Dr. Beckmann, it was answered by Dr. Michard that the two groups probably have different purposes.

After the discussion, it was decided to maintain contacts with Spacewarn, the questions related to Spacewarn messages being already discussed (Morning Session, par. 2.3.).

3. — COSMIC RAY SOUNDING CHAIN

The history of S.P.A.R.M.O. (Solar Particle Altitude Radiation Monitoring Organization) was retraced by Dr. Legrand. Early in 1961, a meeting of Experts in cosmic ray altitude soundings took, in Paris, the resolutions given in Appendix III. The S.P.A.R.M.O. Committee has the following composition : Prof. Ehmert (*Chairman*), Dr. Elliot and Prof. de Jager (*Vice Chairmen*), Dr. Legrand (*Secretary*). Its aim is to organize an European chain of Cosmic Ray high altitude soundings by balloons and small rockets in a large latitude interval (Kiruna, Bedford, France, Lindau, Bologna, Rome) with the purpose of observing rigid particle solar emission (i. e. from flares), auroral emission of X rays, and neutrons and heavy nuclei coming from space. If financed by E.S.R.O. or otherwise, the project will maintain continuous soundings from Kiruna, by balloons and rockets with landing of instruments by parachutes. Predictions and extremely rapid

warnings will be essential for the success of these experiments. Three types of alerts are contemplated :

- *solar flares or type IV bursts* will determinate the most rapid alerts (delays 1-10 minutes). The cooperation of E.R.C.U. will require an improvement in the message contents (probably a new code) and a special warning system (by radio).
- *apparition of a bright solar plage on 3 cm at east limb* will determinate an alert during 14 days for the chain. Data on radio plages could be given by Nançay.
- *geophysical alerts* will be used (delay 24 h-48 h from flares).

The chain will be operated from 1963 onward. Launchings will be announced for simultaneity. Cooperation of Nera and Darmstadt is desirable. In the future, E.S.D.a.C. may cooperate.

After discussion, it was decided to give full support to S.P.A.R.M.O. It was also remarked that, as the project is interesting for E.R.C.U. with regards to predictions, this could provide a good opportunity for coordinating activities of the European centres : the following resolution was adopted :

Resolution IV :

«The European Regional Committee on Ursigrams, *aware* of the needs expressed :

- (a) in Resolution 4.4.1 of C.O.P.E.R.S. (G.T.S.T./23, p. 94, 24-25 Oct. 1961),
- (b) in Resolution IV of the Meeting of Experts of Cosmic Ray High Altitude Experiments (Paris 16-17 Oct. 1961), and
- (c) by the first I.Q.S.Y. Meeting in Paris (26-29 March 1962) and by the Spacewarn network,

considering that many instances in the next few years will require a coordinated system of immediate dissemination of scientific data,

addresses its thanks to the administrations supporting the Ursigram centres and stations in Europe,

and *invites* those administrations to strengthen their support in view of a better coordination between centres, a complete time coverage on the basis of 7 days a week and 24 h. a day, and a system of immediate warning requested by the development of coordinated experiments on a large scale. »

4. — SUGGESTIONS, MISCELLANEOUS

A letter was received from Dr. Ehmert after the meeting and is reproduced in Appendix IV.

The next E.R.C.U. Meeting will be held this year in autumn. The Secretary is invited to take steps for its organizations.

The meeting was closed at 17.30.

APPENDIX I

Agenda

Morning Session : (E.R.C.U. members) :

- (1) Functioning of the Service :
 - (a) relations with C.C.U. ; resolutions of Kyoto meeting ;
 - (b) fusion of the Ursigrām Service with the I.W.D.S.
- (2) Functioning of the European network (centres and stations).
- (3) Suggestions for new codes ; miscellaneous.

Afternoon Session : (Delegates of organizations and E.R.C.U. Members) :

- (1) Previsions for I.Q.S.Y.
- (2) Relations with E.S.R.O. and Spacewarn Network.
- (3) Cosmic Ray Sounding Chain.
- (4) Suggestions ; Miscellaneous.

APPENDIX IIa

Ursigram traffic at Darmstadt (June 1962)

By telex	From Darmstadt (ionosphaere ftz 189291) to	From..... to Darmstadt
SWEDEN — <i>Stockholm</i>	0700z (washdarm- interchange - ursi- gram) 1230z	0900z
NETHERLANDS — <i>Nera</i> (direct link from and to Tokyo)	1230z	1430z
BELGIUM — <i>Uccle Bruxelles</i> Observatoire Royal de Belgique	1230z	
FRANCE — <i>Bagneux</i>	0800z (washdarm- interchange - ursi- gram) 1230z	1030z 1630z
AUSTRIA — <i>Kanzelhöhe</i>		2300z via Funküber- wachungsstelle Klagenfurt
CZECHOSLOVAKIA — <i>Pruhonice</i> (direct link from Moscow)	1000z (washdarm- interchange - ursi- gram) 1230z	1000z
GREECE — <i>Athens</i>	1230z	
U. S. S. R. — <i>Moscow</i>	1230z	
U. S. A. — <i>Washington</i>	1230z	0300z via conac

APPENDIX IIa

Ursigram traffic at Darmstadt (June 1962)

By mail	From Darmstadt (ionosphaere ftz 189291) to	From..... to Darmstadt
<p><i>Stockholm</i> Textilwaegen 7 Generaldirektion der Schwedischen Fernmeldeverwaltung Telestyrel- sens Radiobyra</p>	<p>A B daily but on Satur- day and Sunday</p>	<p>weekly (ufofa, auren)</p>
<p><i>Nederhorst den Berg</i> Generaldirektion der Niederländi- schen PTT Radio Receiving Sta- tion Neara, Chef IRA</p>	<p>A B daily but on Satur- day and Sunday</p>	<p>daily but on Saturday and Sunday</p>
<p><i>Wien XIX</i> Hohe Warte 38 Zentralanstalt für Meteorologie und Geodynamik</p>	<p>A B C D (monthly)</p>	
<p><i>Uccle - Bruxelles</i> Institut Royal Météorologique 3, Avenue Circulaire</p>	<p>A B daily but on Satur- day and Sunday</p>	
<p><i>Bagneux (Seine)</i> 196, rue de Paris M. A. Delouf Jours Mondiaux</p>	<p>A daily but on Sa- turday and Sunday</p>	
<p><i>Sattendorf (Kärnten)</i> Sonnenobservatorium Kanzelhöhe</p>	<p>A B C D daily but on Satur- day and Sunday</p>	

APPENDIX IIa

Ursigram traffic at Darmstadt (June 1962)

By mail	From Darmstadt (ionosphaere ftz 189291) to.....	From..... to Darmstadt
<i>Praha - Sporilov</i> Bocni 2 Geophysikalisches Institut der tschech. Akademie d. Wissensch. Ionosphärische Abtlg.	A daily but on Satur- day and Sunday	
<i>Athens</i> Observatoire National d'Athènes, National Warning Contacts	A B C D daily but on Satur- day and Sunday	
<i>Genève 20</i> Montbrillant Place des Nations Dipl.-Ing. W. Menzel, c/o Union Internationale des Télécommuni- cations	A B C D daily but on Satur- day and Sunday	
<i>Kokubunji - Tokyo</i> Radio Research Laboratories, Mi- nistry of Postal Services	A B daily but on Satur- day and Sunday	via Nera
<i>Fl. Belvoir, Virginia</i> IUWDS World Warning Agency Box 178	A daily but on Satur- day and Sunday	

EXPLANATION OF THE LETTERS A, B, C, D

A = Regional Ursigram (all data collected by R. W. C. Darmstadt)

USSPE 16, 17, 18	UFOFA 73	RAYCO (CORAY) 68, 71	UMAGA 07
USSPA 07	FODEU 71		MAGNE 17, 24
UPATA 07, 18, 48	PROPA 72		
UFLAR 07, 16, 17, 18, 48	USIDA 07, 71, 72		
CORON 18, 16	SWI		
URANA 63	GEOALERT		

B = Extract from French ursigram

USSPA 87	PERTU 77	RAYCO 10, 36	MAGNE 21, 28
USSPE 45	USIDA 69		UMAGA 25, 79
USSPO 21			
CHRAG 10			
UFLAR 10, 79			
CORON 36			
UCORO 13			
RALOC 28			
URANA 79, 80, 86			

C = Copy of washdarm — interchange ursigram

USSPE 09	USIDA 08, 23	UMAGA 25
UPATA 32, 34, 41, 78	27, 33	
UFLAR 05, 08, 32, 34	ADA	
41, 78	PQA	
UCORA 32, 34	PQP	
URANA 33		
URANI 57		
URANP 33, 34		
URANT 33		
PRALA 31		
PLEMC		
PROMO 32		
UFLAC 32		

D = Copy of Nera ursigram

USSPA 46	AUREN	RAYCO 46	TELLU UMAGA 46
USSPE 51	IONNEFOFTO	CORAJ (Tokyo)	
UPATA 51	ION3OEFMIN		
UFLAR 46, 51	UFOFA 51, 30		
URANA 46, 51	USIDA 15, 26, 27,		
URANI 46	46, 52, 93		
URANP 26, 56, 58, 46	UABSB 30		
URANT 03	ADJ		
URALO 46			
RADIA 24			
SOLER (Toyokawa)			

A. Reception.

From : U. T.	BERLIN 13.00	DE BILT 10.00	DARMSTADT 12.00	PARAMARIBO 21.30	HOLLANDIA 09.30	PARIS not fixed
Type of information						
Sun OPTICAL			UFLAR 07 16 17 18 48 83			
Sun RADIO	RADIA 24		URANA 63	URANP 56	URANP 58	
IONOSPHERE	USIDA 24 USIDA 93	IONNE FOF-TO	USIDA 07 71 UFOFA 73 71	USIDA 56	USIDA 58	
GEOMAGNETISM			UMAGA 24	UMAGI 56	UMAGI 58	
COSMIC RAYS						RAYCO 10
AURORAE						
PROPAGATION- COND. WARNINGS		AGIWARN fr. WMO- net	PROGNOSE FUNKWETTER Fridays only			

A. Reception.

From : U. T.	PRAGUE 10.00	STOCKHOLM 09.30	TOKYO 09.30	WASHINGTON 08.00	UTRECHT not fixed	REMARKS
Type of information						
Sun OPTICAL	UFLAR 11 86 USSPE 45 USSPA 87 UPATA 45 SOHRO 86 UCORO 12 UCORA 13	UFLAR 19 22	USSPE 51 UPATA 51 UFLAR 51	UFLAR 05 08 32 41 78 UCORA 32	UFLAR 53	
Sun RADIO	URANA 79 80 86	URANA 22	URANA 51 URANS 03 URANF 03 SOLER TO- YOKAWA	URANA 32 33 URANI 57 URALO 31		

IONOSPHERE	USIDA 11 45 69 FODEU 69 ESFRE 69	USIDE 19 UFOFA 30 ION EFMIN 30 UABEC 30	USIDA 26 27 52 UFOFA 51	USIDA 08 33 41 ION FOFTO 25 ION EFMIN 25 UABSB 09		
GEOMAGNETISM	MAGNE 69 UMAGA 79		UMAGA 26	UMAGA 25		
COSMIC RAYS			CORAJ 51			
AURORAE		AUREN				
PROPAGATION- COND. WARNINGS			ADJ ALERT	ADA-SDW MTA-PA ALERT		

Ursigram traffic at Nera (June 1962)

B. Transmission

	to U. T.	DARMSTADT 14.00	PARAMARIBO 15.30	HOLLANDIA 15.30	PARIS 10.00	MEUDON 10.00
Type of information						
Sun OPTICAL		UFLAR 46 51 53		UFLAR 46 51 53	UFLAR 46 51 53	see PARIS
Sun RADIO		RADIA 24 URANA 46 URANI 46 URALO 46 SOLER TO- YOKAWA	URANP 46	URANP 46	RADIA 24 URANA 46 URANI 46 URALO 46 SOLER TO- YOKAWA	see PARIS
IONOSPHERE		USIDA 26 27 46 52 56 58 93	USIDA 46	USIDA 46	USIDA 26 27 46 52 56 58 93	see PARIS

GEOMAGNETIC	UMAGI 46 56 58	TELLU-UMAGA 46	TELLU-UMAGA 46	UMAGI 46 56 58	see PARIS
COSMIC RAYS				RAYCO 46 CORAJ 51	see PARIS
AURORAE					
PROPAGATION- COND. ALERT					

B. Transmission.

To U. T.	STOCKHOLM 13.00	TOKYO 15.00	WASHINGTON	REMARKS
Type of information				
Sun OPTICAL	UFLAR 11 46 51 53	UFLAR 11 46 53 USSPA 46	UFLAR 11 46 53	
Sun RADIO	URANA 51 URANI 46 URANP 46 SOLER TOYOKA- WA	RADIA 24 URANI 46 URANA 46 URANP 46 URALO 46	RADIA 24 URANI 46 URANA 46 URANP 46 URALO 46	
IONOSPHERE	USIDA 11 15 26 52 56 58 93 27 69 UFOFA 51 UABSC 09	USIDA 11 15 22 69 46 56 58 93 19 UABSC 30	USIDA 11 15 22 69 46 56 58 93 19 ION EFMIN 30 UABSC 30	

GEOMAGNETISM	UMAGI 46 56 58	UMAGI 46 56 58	UMAGI 46 56 58
COSMIC RAYS		RAYCO 46	
AURORAE		AUREN	AUREN
PROPAGATION- COND. ALERT		PROPA 46	

S.P.A.R.M.O.

MEETING OF EXPERTS
OF COSMIC RAY HIGH ALTITUDE EXPERIMENTS HELD IN PARIS,
OCTOBER 16-17, 1961

Resolutions

Cosmic ray observatories have played an important part in the past in laying the basis of our understanding of the electromagnetic conditions in interplanetary space and in the planning of satellite and space probe measurements of the energetic particles and magnetic field in space. Observations in the future can play an equally important part in the study of energetic particle production in the Sun and of the propagation and storage of cosmic rays in the galactic field.

With these considerations in mind it was resolved that :

- (1) the group of Scientists recommends that the above conclusions and addenda be brought to the attention of National Space Research Committees in the countries adhering to C.O.P.E.R.S. asking them to support the scientist who would like to cooperate in this project.
- (2) the National Space Research Committees (be invited) to request the Bureau of C.O.P.E.R.S. to bring the proposed project to the attention of its Scientific and Technical Working groups with a view to putting them on the E.S.R.O. program.
- (3) National Committees be invited to nominate members of a Working Committee for upper atmosphere measurements of energetic particles and radiation.
- (4) the European Regional Committee for Ursigrams and the Scientific and Technical Working groups of C.O.P.E.R.S. are invited to consider the problem of rapid alerts.

APPENDIX IV

MAX PLANCK INSTITUT FÜR AERONOMIE

Prof. Dr. A. EHMERT to Prof. Dr. R. COUTREZ

6 June 1962.

Dear Colleague,

You were so kind to invite me by your letters from April 26th and May 28th to join the London meeting with respect to the Cosmic Ray Sounding Chain.

Unfortunately I was some weeks in the U. S. A. and then on other urgent trips that were not foreseen and missed therefore your invitation until to my return and had so much urgent post that I was not able to come through all.

I apologize for that and for my late answering, that may reach you by Dr. Beckmann. I might be very interested to join but for different reasons it is quite impossible for me. Dr. Legrand, the Secretary of the provisory Cosmic Ray Sounding Chain Organisation (S.P.A.R.M.O. Solar Particles and Radiation Monitoring Organisation) wrote me just that he will attend and I hope that either Prof. de Jager, the Vice President may attend.

The need is to have a warning for the arrangement of ascends. But that is not possible by ursigrams and other very fast channels must be found, by instance by direct radio communication between the participant institutions.

The other question is the code for communication of the results in the ursigrams in connection with the riometer results. One needs to tell X-Ray impacts, their intensity, the degree of fluctuation and the total duration ; further proton-events, their intensity, the onset and the slope of their decrease ! I am not able to give to-day a proposal for a code, but it is possible to work out it within two months regarding the results of the various existing measurements. The final code depends on the results with a standard instrument that will be fixed within this year. Steady records with such an instrument will provide data usable for ursigrams

in I.Q.S.Y. and I hope also earlier what is so far a question of the organisation of steady measurements.

Quite another question is a new code for the normal galactic cosmic rays. We perform now records giving directly well corrected intensities and it is possible to give global values. The difference for the various stations is only a scale factor. This factor is available from the records of any station, so that the station can give intensities in a scale that is the same for all stations throughout the world so far as only galactic cosmic rays are present, what is the case for most of the time. A certain restriction arises from small additional variations depending on local time and latitude. I think it may finally be sufficient to give 2-hours-means (2 figures, by instance 46 or 48 and so on for any mean) or if that is too much also 4 hour means. This information from 3 good stations, an european, an american and a japanese one, will provide a very valuable *absolute* record of the modulation-situation highly interesting for many geophysical fields. I am preparing a paper with a proposal for it. Unfortunately it is not yet ready.

The rare events of solar cosmic rays need a special code similar to that used in Rayco (but for galactic C R, where it proved to be not good). In this case any station can contribute the time of onset, the sort of instrument and the maximum intensity.

Dear Colleague, I regret to be able to give to you to-day only this brief information being in a hard press of time.

Sincerely yours.

Comité Régional Européen des Ursigrammes (E. R. C. U.)

RÉSOLUTIONS

prises au cours de la réunion tenue à Londres le 8 juin 1962

Composition du Comité : Le D^r Michard remplacera le D^r Denisse comme représentant la France au sein du Comité.

Résolution I

Considérant :

- a) Les Résolutions I et II du C.R.E.U. adoptées à Bruxelles les 6 et 7 mai 1958 (*Bulletin d'Information de l'U.R.S.I.*, n° 109, 1958).

b) La Résolution I du C.R.E.U. adoptée à Bruxelles les 28 et 29 janvier 1960 (*Bulletin d'Information de l'U.R.S.I.*, n° 119, 1960).

c) Le compte rendu de la réunion C.C.U.-I.W.D.S. tenue à Kyoto du 8 au 11 septembre 1961 (*Bulletin d'Information de l'U.R.S.I.*, n° 130, 1962).

Le Comité Régional Européen des Ursigrammes, à l'unanimité :

a) *marque son accord* sur la fusion du Service des Ursigrammes et le Service International des Journées Mondiales en un seul organisme, le Service International des Ursigrammes et des Journées Mondiales (I.U.W.D.S.).

b) *confirme* les Résolutions I et II des 6 et 7 mai 1958, relatives à son fonctionnement et à ses relations avec le C.C.U., et étend la Résolution II à ses relations avec le nouveau Comité Directeur de I.U.W.D.S.

c) *confirme* la Résolution I de janvier 1960 sur l'accord du projet de mandat des groupes régionaux d'Ursigrammes,

d) *marque son accord* sur le principe suivant lequel les Comités Régionaux d'Ursigrammes seront représentés au sein du Comité Directeur de l'I.U.W.D.S. de la même façon qu'ils étaient représentés au sein du C.C.U.

Résolution II

Considérant le développement des organisations européennes et extra-européennes et tenant compte de l'accroissement attendu des demandes au cours des prochaines années, le Comité Régional Européen des Ursigrammes estime qu'un fonctionnement à temps plein améliorera considérablement les possibilités du réseau des Ursigrammes, et invite, avec insistance, les centres européens de Darmstadt, Néra et Paris à entreprendre des démarches pour que, aussitôt que possible, il y ait un fonctionnement pendant 7 jours par semaine (y compris le dimanche) et pendant 24 heures par jour.

Résolution III

Il est décidé, étant donné le but des Ursigrammes et en vue de l'économie des transmissions, que les observations scientifiques dans les disciplines, jouissent d'une priorité dans l'ordre donné, en commençant par les plus importantes :

- a) *Première priorité* : Flambes solaires, sursauts radio solaires (spécialement ceux du type IV), perturbations ionosphériques à début brusque, absorption ionosphérique (spécialement le type III), couronne solaire (raie jaune 5694, localisation des sources radio solaires, chromosphère solaire.
- b) *Seconde priorité* : Nombres qualificatifs de la propagation ionosphériques, prévisions ionosphériques et fréquences critiques, occurrences géomagnétiques importantes, indices géomagnétiques K, couronne solaire (raie verte 5303), rayons cosmiques, taches solaires, heures de surveillance des flambes solaires, aurores, sifflements, séismologie.

Cette liste devrait être considérée comme un minimum. A ce point de vue, il est recommandé de radiodiffuser au moins les données de première priorité, les autres étant envoyées par la poste. Il est recommandé d'établir des accords entre centres et observatoires en vue de la radiodiffusion.

Résolution IV

Le Comité Régional Européen des Ursigrammes, *ayant pris connaissance* des besoins exprimés :

- a) dans la Résolution 4.4.1. du C.O.S.P.E.R.S. (Comité pour l'Organisation des Recherches Européennes dans l'Espace) (G.T.S.T./23, p. 94, 24 et 25 oct. 1961).
- b) dans la Résolution IV de la Réunion des Experts pour les Expériences en haute altitude sur les Rayons Cosmiques (Paris, 16 et 17 oct. 1961), et
- c) lors de la première réunion de l'I.Q.S.Y. à Paris (26 au 29 mars, 1962) et par le réseau « Spacewarn »,

et *considérant*,

que dans les prochaines années, de nombreuses instances auront besoin d'un système coordonné de dissémination immédiate de données scientifiques,

adresse ses remerciements aux administrations ayant la charge des centres et stations d'Ursigrammes en Europe, et

invite ces administrations à renforcer leur appui en vue d'arriver à une meilleure coordination entre les centres, à un recouvrement complet dans le temps sur la base de 7 jours par semaine et 24 heures par jour, et à un système d'avertissement immédiat exigé par le développement d'expériences coordonnées à grande échelle.

INTER-UNION COMMITTEES

Inter-Union Committee for Frequency Allocations for Radio Astronomy and Space Science (I. U. C. A. F.)

Radio and outer space

by R. L. Smith Rose

(reprinted from *Journal of the Institution of Electrical Engineers*,
vol. 8, n° 91, July 1962)

Radio astronomy is by no means a new science to the younger generation of today, for it was in 1932 that Karl Jansky announced the discovery of radio waves from cosmic sources. In the intervening thirty years the subject has made great strides, and the research conducted in many parts of the world has made a major contribution to our knowledge and understanding of the universe around us.

The pursuit of radio astronomy has also played an important part in the development of practical devices, such as large aerial systems and specially sensitive receivers, which were quickly applied to other radio techniques, including the new space science. This latter science arose from the first use of artificial Earth satellites during the International Geophysical Year of 1957-58, probably the largest co-operative scientific enterprise ever undertaken by man.

Continued and effective research in these new fields of radio astronomy and space science requires the use of certain bands of frequencies that are adequately protected from interference by other users of the radio-frequency spectrum, which now extends from 10 kc/s or lower to 40 Gc/s or higher (10^4 to 4×10^9 c/s).

Radio astronomy may be regarded as a logical development of the centuries-old science of optical astronomy, which has relied on the use of the higher-frequency part of the electromagnetic spectrum, comprising the ultraviolet, visible and infra-red regions.

The addition of the radio-frequency part of the spectrum has vastly extended the scope of astronomical techniques for the exploration of outer space. In addition to the reception of radio waves from the galaxy, many discrete sources have been identified as radio stars, and the location of a spectral line due to emission from atomic hydrogen was predicted, and later confirmed, by radio astronomers.

In the past decade or so, the use of radio waves for all purposes such as communication, navigation and broadcasting, including television, has expanded on an enormous scale, with a consequent increasing pressure for allocations of portions of the spectrum. It has therefore become essential for radio astronomy to establish its claim to the protection of certain bands of frequencies for its own use.

At the International Administrative Radio Conference held at Geneva in 1959, the « radio astronomy service » was recognized as a service involving the reception of radio waves of cosmic origin (see « Radio Regulations », International Telecommunication Union, Geneva, 1959). From this definition, it is clear that it differs from all the other radio services in that it does not make use of radio emissions from man-made sending stations. Its work is based on the reception and study of the natural emissions of sources in outer space. Thus the radio astronomer can cause no interference to other services ; but he justifiably seeks the exclusive use of certain bands of frequencies in the spectrum, so that he may pursue his studies free from interference from the transmitting stations of other services. Furthermore, since the radiation he is seeking to measure is in many cases extremely weak, he must necessarily use advanced techniques—large aerial systems and sensitive receivers. But the expense and effort required to install and operate such systems can be justified only if he is assured of adequate protection from interfering emissions.

The radio astronomer seeks, first, protection in the bands where naturally-occurring radiation exists and, secondly, protection of a number of frequency bands throughout the spectrum, in order to be able to investigate the continuum of radiation from the universe. On the first point, the 1959 Radio Regulations give an exclusive allocation of the band 1400-1427 Mc/s (the hydrogen line) to radio astronomy, but other bands of naturally-occurring

radiation, such as deuterium at 327.4 Mc/s and OH at 1667 Mc/s, are admitted only on a shared basis with other services.

For the second class of research, radio astronomers have stressed their need to use a minimum of about 10 or 12 bands of frequencies distributed throughout the spectrum. The approximate positions of some of these have been indicated as follows : 40, 80, 160, 640, 2560, 5120 and 10240 Mc/s. While the claim to most of these is recognized by footnote references in the 1959 Radio Regulations, in all cases the use of the frequencies allocated is on a shared basis with the operators of other radio services. This is very unsatisfactory to the radio astronomer, who is naturally very anxious to press his case for a more substantial measure of protection.

At the European Broadcasting Conference held at Stockholm in 1961, it was agreed that so far as the European region was concerned no major television broadcasting stations should be planned to operate in the band 606-614 Mc/s, so that this might be kept freely available for the radio-astronomy service. This agreement was a logical consequence of recommendation No. 32 of the Radio Regulations. The same recommendation refers to the possibility of making a firm allocation in the range 37-41 Mc/s, where frequencies at 38 and 41 Mc/s are being used, or are proposed for use, by radio astronomers.

The new space science requires similar protection. The original purpose of placing artificial satellites in orbit round the Earth was to extend our knowledge of the upper atmosphere and the space beyond and to measure such quantities as solar radiation, cosmic rays and the Earth's magnetic field at much greater distances than had hitherto been possible. At the 1959 Conference, some dozen frequencies were allocated for research purposes, but all but three of these were on a secondary basis, shared with other radio services as the primary users. One band — 136 to 137 Mc/s — was recommended for the tracking of space vehicles as a primary service, and steps have already been taken in Britain — and perhaps other countries — to clear this band of other users, who are generally operating aeronautical mobile services.

Since the 1959 Conference the use of space vehicles for terrestrial communication has made considerable progress, and preparations are well advanced for tests of satellite communication across the North Atlantic. While this gives reason for great satisfaction,

such a practical application must not be permitted to diminish the allocation of frequencies for essential research conducted with the aid of satellites travelling in orbits both within and outside the Earth's atmosphere. Already one satellite — Ariel — equipped with scientific instruments developed in Britain has been launched by the United States National Aeronautics and Space Administration. Its position is being determined by tracking stations in a number of other countries, and the results of measurements are being transmitted by radio to the observing stations.

Another satellite is being prepared to sound the ionosphere from above, on the command of selected observing stations in various parts of the world. Again, the full success of the operation depends on the exclusive use of a series of frequencies, so that command, telemetry, tracking and communication can be conducted free from interference by any other service. Experiments to be conducted with other satellites are in an advanced stage of planning, and it is thus very desirable that the research workers involved can be assured that, so far as the use of radio frequencies is concerned, they will be given every encouragement and support.

In conclusion, it is hoped that the Administrative Council of the International Telecommunication Union will decide to convene the Extraordinary Administrative Radio Conference provisionally scheduled for 1963, so that full consideration can be given to the claims of both radio astronomers and space scientists to have a greater degree of protection from interference in the portions of the spectrum assigned to their use.

**Report of the Inter Union Committee for Frequency Allocations
for Radio Astronomy and Space Science
to the Fourteenth Meeting of the I.C.S.U. Executive Board,
Prague**

OCTOBER, 1962

1. The Constitution and Terms of Reference of this Inter-Union Committee remain as given in Appendix I of the Report to the Ninth General Assembly held in London in September 1961. The Committee has co-opted three consultant members, viz. Dr.

J. H. D. van der Toorn (on a personal basis), Mr. A. H. Cata (representing I. F. R. B., Geneva) and Dr. E. Metzler (Director of C.C.I.R.).

2. While much of the work of the Committee has been conducted by correspondence, two meetings have been held : the first in London on 19th and 20th of October, 1961 ; and the second in Amsterdam on 11th and 12th April, 1962. Each of these meetings was attended by all members with the exception of Prof. L. G. H. Huxley (Australia) and Drs. V. Ilyin and V. V. Vitkevitch (U. S. S. R.).

Full reports of the meetings have been distributed to the Committee, and arrangements made for their publication in the *U.R.S.I. Information Bulletin* (for the London meeting, see Bulletin No. 129, November-December 1961).

3. In March 1962, the *Chairman* (Dr. J. F. Denisse) and *Secretary-General* (Dr. R. L. Smith-Rose) represented the I.U.C.A.F. at the Washington meeting of Study Group IV of the International Radio Consultative Committee (C.C.I.R.), which is concerned with the international technical problems associated with radio astronomy and space research. The C.C.I.R. also noted the Recommendation of the European Broadcasting Conference (Stockholm 1961) that national broadcasting services should, so far as practicable, avoid the use of the frequency band 606-614 Mc/s (Channel No. 38) which is assigned to the radio astronomy service ; and it was hoped that this principle might be accepted in other countries outside the European Region.

A report on C.C.I.R. Question No 218 (IV) entitled « Passive Radio Astronomy » was presented and accepted by the Study Group. This report contained two appendices : the first being an analysis of the radiation flux density which radio astronomers are seeking to have protected ; while the second was the beginning of a catalogue of radio astronomical observatories. It was agreed by the C.C.I.R. that this catalogue would be completed so far as possible by the International Frequency Registration Board (I.F.R.B.) in Geneva, with the co-operation of the 114 national members of the International Telecommunication Union (I.T.U.).

4. All members of the I.U.C.A.F. Committee have co-operated in seeking the assistance of the national scientific members of U.R.S.I., I.A.U. and C.O.S.P.A.R. to invite their individual

national (postal and communications) administrations to make representations to the I.T.U. to ensure that the subject of radio astronomy, as well as space science, is included in the agenda for the Administrative Conference of I.T.U. to be held in October 1963. Two Recommendations adopted at the Amsterdam meeting of the Committee were reproduced in *U.R.S.I. Information Bulletin*, n° 132, p. 38. A special telegram was sent to the U. S. S. R. Academy of Sciences with the view of securing the co-operation of the Soviet Union in this matter.

5. Some sixteen bands of frequencies are mentioned in the International Radio Regulations (1959) as being in use by radio astronomers. But, with the exception of the Hydrogen band at 1420-27 Mc/s, all these bands are shared with other radio services, so that some interference is inevitable with astronomy. Efforts will be continued by the Committee, on both a national and an international basis, to obtain better protection from interference for the pursuit of radio astronomy. These efforts include the continued presentation of a case for obtaining facilities to conduct experiments in the frequency band covered by the Deuterium line (322-329 Mc/s) which is at present occupied by radio services under the N.A.T.O. authorities.

6. In the case of Space Research, some 23 bands of frequencies have been allocated by the I.T.U.; but in only 5 of these is the allocation on a primary basis. In all other cases the frequency band allotted is on a shared basis with other radio services. The differing requirements of space communications, telemetry and command as well as of general research, are being studied to ensure that, as far as possible, adequate protection from interference is obtained in the future. Progress has already been made in some countries to clear the band 136-137 Mc/s from its use by other radio services, so that these frequencies may be devoted in the future solely to research on, and tracking of, space vehicles.

7. The Committee have given considerable attention to the « Project West Ford » in which large number of dipole « needles » are to be projected to form a belt around the earth as a possible aid to world-wide communications. Since the failure of the first experimental launching, there has been some disparity in the predictions made as to the effect of such a belt of needles in reflecting radio waves back to earth. It is considered necessary

to investigate the nature of the interference likely to be experienced by radio astronomers working at frequencies above 3000 Mc/s, as a result of the existence of such a belt of needles; and also to obtain some reliable estimate of the life-time of such a belt. The matter is being actively pursued in correspondence with the U. S. Government Lincoln Laboratory which is closely associated with the « West Ford » project.

8. During the meeting of the Committee in Amsterdam, a small-sub-committee representative of the three constituent bodies of I.U.C.A.F. considered the financial position of the latter.

It will be noted that while during 1961 the income of the Committee exceeded its expenditure, and this is likely to be repeated on a reduced scale in 1962, a much greater commitment will be involved during 1963, when I.U.C.A.F. has to make important representations at the I.T.U. conferences. It has therefore proved very desirable to build up a reasonable reserve for use during the last year of the period 1961-63.

U.R.S.I. PUBLICATIONS REVIEW

Monograph of Radioelectric Measurements and Standards

Monographie sur les mesures et étalons radioélectriques

edited by/établie par

B. DECAUX

Elsevier Publishing Co, 1961

6 × 9" vi + 116 pages 14 tables 6 illustrations

The objectives laid down for Commission I of the International Scientific Radio Union are to establish common methods of radio measurements, coupled with the comparison and standardization of measuring instruments used in radio science. At the XIIIth General Assembly of U.R.S.I., held in London in September 1960, seven technical sessions of Commission I were held, at which papers were read and discussed on the following four main topics :

1. Frequency and time measurements.
2. Standardization of quantities and measurement techniques.
3. Power measurements; in particular, the international inter-comparison of UHF power measurement devices.
4. Measurement of physical quantities by radio techniques.

In the present monograph a summary (in French) of the main points which arose in the papers and the discussions is first given for each of these topics. These are followed by abbreviated versions of the papers themselves (26 in English and 1 in French). Finally, the texts of the Resolutions formulated by Commission I at this and at the preceding General Assembly in 1957 are given in French and English.

Within topic (1), frequency and time measurements, discussions centred on three main aspects : quartz standards (3 reports),

atomic standards (6 reports), and the transmission of standard frequency and time signals (7 reports). Two of the total of five resolutions stemmed from the latter, while one each arose from topics (2) and (3). The measurement of physical quantities by radio techniques (topic (4)) includes 7 reports dealing with measurements of distance, the velocity of electromagnetic waves (one resolution) and the proton gyromagnetic ratio.

The monograph, which is well produced, includes a short author index. It will be of value to all concerned with radio measurements and standards. It may be profitably supplemented by the National Committee Reports to Commission I, published separately by U.R.S.I.

U.R.S.I. Special Report No. 6 on Radio Observations of the Aurora

viii + 60 pages

6 × 9''

2 illustrations

Elsevier Publishing Co, 1961

The publication of this report follows a recommendation of Commission III of the International Scientific Radio Union made at the XIIth General Assembly of the Union in Boulder, U. S. A., in 1957. It has been prepared by a small committee of experts consisting of the following members : J. H. Chapman (*chairman*), H. G. Booker, C. E. Ellyett, L. Harang, A. C. B. Lovell, L. Owren, and A. M. Peterson. The main text is in English, but summaries of each section in French are included at the end of the report.

Following a definition of the term «radio (or radar) aurora» the subject is treated in four main chapters. Under the title «the occurrence of radio auroral reflections» consideration is given to temporal and spatial variations and their relation to other geophysical phenomena. Here too is considered the important question of the relation of radio auroral echoes to visible aurorae. Next, the «characteristics of radio auroral echoes» are discussed, their cross-section polarization, and properties in range, depth and extent. This leads naturally to the chapter on «radio auroral reflection mechanisms» in which it is concluded

that both the critical reflection mechanism and weak scattering from elongated irregularities are of importance according to the frequency used. Finally, the occurrence of « auroral radio noise » is discussed, together with suggested theories of its emission.

A characteristic of this report is that each separate section concludes with a short summary, and all these summaries are brought together again in a final chapter both in English and in French before the conclusions. The treatment throughout is very concise and well documented, and the report succeeds in bringing together in a small space the salient points from a large number of scattered sources.

UNION INTERNATIONALE DES TÉLÉCOMMUNICATIONS

Conférence Extraordinaire

La date d'ouverture de la Conférence Extraordinaire de l'U.I.T., chargée de l'étude des problèmes spatiaux, est prévue pour le 7 octobre 1963, à Genève.

INTERNATIONAL TELECOMMUNICATION UNION

Extra-ordinary Conference

The opening of the I.T.U. Extra-ordinary Conference on the investigation of space problems is fixed on October 7th, 1963, Geneva.

C. C. I. R.

Xme Assemblée Plénière

La X^e Assemblée Plénière du C.C.I.R. aura lieu à la Nouvelle Delhi pendant les mois de janvier et de février 1963.

C. C. I. R.

Xth Plenary Assembly

The Xth Plenary Assembly of the C.C.I.R. will be held at New Delhi during January and February 1963.

SYMPOSIA

Symposium sur la Galaxie et les Nuées de Magellan

Canberra et Sydney, 18-28 mars 1963

Le Prof W. N. Christiansen et M. J. Lequeux ont été désignés comme représentants de l'U.R.S.I. au sein du Comité Organisateur de ce Symposium qui est organisé par l'Union Astronomique Internationale avec la collaboration de l'U.R.S.I.

Symposium on the Galaxy and Magellanic Clouds

Canberra and Sydney, March 18-28, 1963

Prof. W. N. Christiansen and Mr. J. Lequeux have been appointed as U.R.S.I. representatives on the Organizing Committee of this symposium organized by I.A.U. with the co-operation of U.R.S.I.

Symposium International sur la Théorie de l'Information

Bruxelles, 3-7 septembre 1962

Le Symposium International sur la Théorie de l'Information de 1962 est patronné par l'I.R.E. Professional Group on Information Theory et organisé conjointement par la Section de Benelux de l'I.R.E. et la Société Belge des Ingénieurs des Télécommunications et d'Electronique (S.I.T.E.L.) avec la coopération de l'Université Libre de Bruxelles. Tous ceux qui prennent intérêt à la théorie de l'information sont cordialement invités à la réunion.

Les communications qui seront discutées durant le Symposium seront publiées à l'avance (début août) dans un numéro spécial des I.R.E. Transactions on Information Theory, qui sera distribué à tous les participants.

Des renseignements complémentaires peuvent être obtenus en s'adressant au Secrétaire du Symposium : M. SELLESLAGS, Laboratoire d'Electricité Générale, Université Libre de Bruxelles, 50, avenue F. D. Roosevelt, Bruxelles 5, Belgique.

International Symposium on Information Theory

Brussels, Belgium, September 3-7, 1962

The 1962 International Symposium on Information Theory is sponsored by the I.R.E. Professional Group on Information Theory and is being organized jointly by the Benelux Section of the I.R.E. and the Société Belge des Ingénieurs des Télécommunications et d'Electronique (S.I.T.E.L.), with the cooperation of the Université Libre de Bruxelles. All who have a professional interest in information theory and its applications are cordially invited to attend.

The papers to be discussed at the Symposium will be published in advance (early August) in a special issue to the I.R.E. Transactions on Information Theory, which will be distributed to all symposiasts.

Further information available by the Secretary of the Symposium : Mr. SELLESLAGS, Laboratoire d'Electricité Générale, Université Libre de Bruxelles, 50, avenue F. D. Roosevelt, Bruxelles 5, Belgium.

**Abstract of the chronological list of conferences,
meetings and exhibitions in the field of atomic energy**

	Subject and Location	Convening Body and/or Organizers or Sponsors	Address for Enquiries
1962 July 2-6	International Conference on the Ionosphere, including Ionospheric Constitution and Ionizing Radiations, and Mathematics of Wave Propagation through the Ionosphere — London, U. K.	Institute of Physics and Physical Society.	Admin. Assistant, Institute of Physics and Physical Society, 47, Belgrave Sq., London S. W. 1, U. K.
2-6	Gordon Research Conference on Chemistry and Physics of Space — Tilton, New Hampshire, U. S. A.	American Association for the Advancement of Science.	Mr W. G. Parks, Director Gordon Research Conferences, Univ. of Rhode Island, Kingston, R. I., U. S. A.
16-20	International Conference on Instrumentation for High Energy Physics (by invitation only) — Geneva, Switzerland.	Commission on High Energy Physics of the International Union of Pure and Applied Physics.	Scientific Conference Secretariat, C.E.R.N., Geneva, 23, Switzerland.
August 13-15	Conference on Electromagnetic Scattering — Potsdam, New York, U. S. A.	Clarkson College of Technology; Division of Colloid and Surface Chemistry of the American Chemical Society; Air Force Cambridge Research Laboratories; Office of Aerospace Research, U. S. Air Force.	Dr. Milton Kerber, Clarkson College of Technology, Potsdam, N. Y., U. S. A.

	Subject and Location	Convening Body and/or Organizers or Sponsors	Address for Enquiries
14-17	3rd International Conference on Precision Electromagnetic Measurements, including Quantum Electronics in Precision Measurements and Atomic Frequency and Time — Boulder, Colorado, U. S. A.	National Bureau of Standards; Institute of Radio Engineers; American Institute of Electrical Engineers.	Mr. J. F. Brockman, Radio Standards Laboratories, National Bureau of Standards, Boulder, Colo., U. S. A.
September	Conference on Components for Microwave Circuits — London, U. K.	The Institution of Electrical Engineers.	The Secretary, The Institution of Electrical Engineers, Savoy Pl., London, W. C. 2, U. K.
October 8-10	National Electronics Conference — Chicago, Illinois, U. S. A.	Institute of Radio Engineers; American Institute of Electrical Engineers.	National Electronics Conference, 228 N. La Salle, Chicago, Ill, U. S. A.
10-12	15th Gaseous Electronics Conference. Topics : Basic Processes and the Mechanism of Plasma Physics, with Special Emphasis on Physics of the Ionosphere — Boulder, Colorado, U. S. A.	National Bureau of Standards; American Physical Society.	Mr. J. M. Richardson, Secretary, 1962, Gaseous Electronics Conf., Boulder Labs. National Bureau of Standards, Boulder, Col., U. S. A.
13-21	9th International Fair of Electronics Telecommunications, Automation and Nucleonics — Ljubliana Yugoslavia		Gospodarsko Razstavisce, Ljubljana, Yugoslavia.

15-18	Symposium on Space Phenomena and Measurements, including Recent Satellite Research on Energetic Particles and Magnetic Fields, and Plasma Physics — New York, U. S. A.	Professional Group on Nuclear Science of the Institute of Radio Engineers; U. S. Atomic Energy Commission; National Aeronautics and Space Administration.	Mr. Michael Ihnat, AVCO Corporation, 201, Lowell St., Wilmington, Mass., U. S. A.
29 Oct.- 2 Nov.	Symposium on the Basic Environmental Problems of Man in Space — Paris, France.	International Academy of Astronautics, International Astronautical Federation; U.N.E.S.C.O.; International Atomic Energy Agency.	Mr. Th. von Karman, Int. Academy of Astronautics, 12, rue de Gramont, Paris 2 ^e , France.
November 12-15	8th Annual Conference on Magnetism and Magnetic Materials, including Topics on High Fields of Superconductivity and Magnetism — Pittsburgh, Pennsylvania, U. S. A.	American Institute of Electrical Engineers; American Institute of Physics.	Dr. A. Clarke Beiler, Westinghouse Electric Corporation, Materials Research Labs., K-90, East Pittsburgh, Pa., U. S. A.
1963 February 11-15	3rd Quantum Electronics Conference — Paris, France.	Institute of Radio Engineers; Société Française des Electroniciens et Radioélectriciens.	Madame Cauchy, 3 ^e Congrès d'Electronique Quantique, 7, rue de Madrid, Paris 8 ^e , France.
July 22-26	3rd International Conference on the Physics of Electronic and Atomic Collisions — London, U. K.	University College, London.	The Conference Secretaries, Physics Department, University College, Gower St., London, W. C. 1, U. K.

UNESCO

Conférence Intergouvernementale sur la Protection des Biens Culturels en cas de Conflit Armé

Le Gouvernement des Pays-Bas vient de publier les *Actes* de la Conférence convoquée par l'U.N.E.S.C.O., tenue à La Haye du 21 avril au 14 mai 1954 (Staatsdrukkerij - en Uitgeverijbedrijf, La Haye, 1961).

Entr'autres sujets ce volume de 464 pages contient les documents suivants :

- Acte final de la Conférence.
 - Convention pour la Protection des Biens Culturels en cas de Conflit Armé (Texte et Règlement).
 - Protocole pour la Protection des Biens Culturels en cas de Conflit Armé.
 - Résolutions adoptées par la Conférence.
 - Procès-verbaux de la Conférence.
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Intergovernmental Conference on the Protection of Cultural Property in the Event of Armed Conflict

The Government of the Netherlands has just issued : Records of the Conference convened by the U.N.E.S.C.O., held at the Hague from 21 April to 14 May, 1954 (Staatsdrukkerij - en Uitgeverijbedrijf, The Hague, 1961).

Inter alias this 452 pages volume contains the following documents :

- Final Act of the Conference.
- Convention for the Protection of Cultural Property in the Event of Armed Conflict (Text and Regulations).
- Protocol for the Protection of Cultural Properties in the Event of Armed Conflict.
- Resolutions adopted by the Conference.
- Minutes of the Conference.

Details of Unesco publications in preparation

Unesco Source book for Science Teaching

Revised and enlarged edition

Good science teaching must be based on observation and experiment, facilities for which are still lacking in many parts of the world. The U.N.E.S.C.O. Source Book for Science Teaching, containing instructions for making many simple pieces of apparatus and describing a wide range of scientific experiments designed to provide observations on which effective teaching may be based, seeks to remedy this lack.

A new, revised and enlarged edition of this U.N.E.S.C.O. best-seller, the original edition of which was reprinted eleven times, and which has been translated into more than twenty languages, is now in preparation.

Category A :

Approx. no. of pages : 256, ill.

Approx. price : Cloth-bound — \$ 4.00, 20/-, 14 NF.

Paper cover — \$ 3.00, 15/-, 10.50 NF.

Approx. date of publication : July 1962.

A revised edition in French will also be issued.

Statistics on Radio and Television, 1950 1960

(*Statistical reports and studies*, 8)

TABLE OF CONTENTS

- I. *Radio broadcasting* :
 - 1. Organization.
 - 2. Radio broadcasting transmitters.
 - 3. Radio broadcasting receivers.
- II. *Television broadcasting* :
 - 4. Organization.
 - 5. Television broadcasting transmitters.
 - 6. Television broadcasting receivers.
- III. *Radio and television* :
 - 7. Radio programmes.
 - 8. Suggestion for an international classification of radio programmes.
 - 9. Television programmes.
- IV. *Statistical tables* :
 - A. Radio broadcasting.
 - B. Television broadcasting.

Category B :

Approx. price : \$ 1.00, 5/- stg., 3.50 NF.

Approx. date of publication : October 1962.

Will also be published in French.

BIBLIOGRAPHIE

Commission Electrotechnique Internationale (CEI)

La C.E.I. vient de publier le Rapport du Bureau central pour 1961. Des exemplaires de ce rapport peuvent être obtenus en s'adressant au Secrétariat Général de l'U.R.S.I.

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Publication 56-1 B. Première édition. — Règles de la C.E.I. pour les disjoncteurs à courant alternatif. Modifications au Chapitre I : Règles relatives au fonctionnement lors de courts-circuits, concernant le pouvoir de coupure asymétrique des disjoncteurs.

Publication 71 A. Première édition. — Supplément à la Publication 71 : Recommandations pour la coordination de l'isolement. Guide d'application.

Ces publications sont en vente au Bureau Central de la C. E. I., 1, rue de Varembe, Genève, au prix de Fr. s. 4,50 l'exemplaire pour la Publication 56-1 B, plus frais de port, et de Fr. s. 12 l'exemplaire plus frais de port pour la Publication 71 A.

Union Internationale des Télécommunications

L'U.I.T. vient de publier :

1. — la 1^{re} édition de la *Liste internationale des fréquences*. Cette liste remplace le Répertoire des fréquences et a été éditée dans la forme prévue à l'Appendice 9 au Règlement des radiocommunications (Genève, 1959).

La 1^{re} édition de la Liste internationale des fréquences comprend les états signalétiques des assignations de fréquences inscrites dans le Fichier de référence international des fréquences à la date du 1^{er} mai 1961. Elle est tenue à jour au moyen de suppléments récapitulatifs trimestriels.

Ce document comprend une préface et trois volumes. La Préface a été publiée séparément en langues française, anglaise et espagnole. Le Volume III a été édité en quatre fascicules distincts qui peuvent être livrés séparément. Les titres et en-têtes des colonnes des Volumes I à III figurent en langues française, anglaise, espagnole, russe et chinoise.

Le prix de vente a été fixé comme il suit :

<i>Préface</i> aux trois volumes, en langue française, anglaise ou espagnole	10.— francs suisses
<i>Volume I.</i> — Assignations de fréquence dans les bandes comprises entre 10 et 5950 kHz	85.— francs suisses
<i>Volume II.</i> — Assignations de fréquence dans les bandes comprises entre 5950 et 28.000 kHz ..	100.— francs suisses
<i>Volume III. Partie A.</i> — Assignations de fréquence dans les bandes comprises entre 28 MHz et 50 MHz, à l'exclusion des stations de radiodiffusion	10.— francs suisses
<i>Volume III. Partie B.</i> — Assignations de fréquence de la Région I dans les bandes comprises entre 50 et 40.000 MHz, et assignations de fréquence aux stations de radiodiffusion de la Région I dans les bandes comprises entre 28 et 50 MHz	22.— francs suisses
<i>Volume III. Partie C.</i> — Assignations de fréquence de la Région 2 dans les bandes comprises entre 50 et 40.000 MHz	19.— francs suisses
<i>Volume III. Partie D.</i> — Assignations de fréquence de la Région 3 dans les bandes comprises entre 50 et 40.000 MHz, et assignations de fréquence aux stations de radiodiffusion de la Région 3 dans les bandes comprises entre 28 et 50 MHz	8,50 francs suisses

2. — *La liste des voies d'acheminement des communications téléphoniques internationales, 1962.*

Cette liste est publiée conformément aux dispositions de l'article 3, paragraphe 5. (2) et de l'article 44 du Règlement téléphonique (révision de Genève, 1958), en tenant compte des Avis du C.C.I.T.T.

Ce document, comprenant six fascicules, a fait l'objet d'une édition trilingue (française, anglaise et espagnole). Le prix de vente d'une collection des six fascicules trilingues a été fixé à 17,05 francs suisses; toutefois, ces fascicules peuvent également être livrés séparément aux prix suivants :

Fascicule I : Liste des voies en Europe	8.— francs suisses
Fascicule II : Liste des voies en Afrique	1,85 francs suisses
Fascicule III : Liste des voies en Amérique	2,20 francs suisses
Fascicule IV : Liste des voies en Asie	1,60 francs suisses
Fascicule V : Liste des voies en Océanie	—,55 francs suisses
Fascicule VI : Liste des voies intercontinentales ...	2,85 francs suisses

Ces prix comprennent l'emballage et les frais de port pour envoi par la poste ordinaire dans le monde entier.

BIBLIOGRAPHY

International Electrotechnical Commission (I.E.C.)

The I.E.C. has just issued the Central Office Report for 1961. Copies are available by request to the General Secretariat of U.R.S.I.

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Publication 56-1 B. First edition. — I.E.C. Specification for alternating current circuit-breakers. Amendments to Chapter I : Rules for short-circuit conditions, concerning th asymmetrical breaking capacity of circuit breakers.

Publication 71 A. First edition. — Supplement to Publication 71 : Recommendations for insulation coordination. Application guide.

These publications are on sale at the Central Office of the I.E.C., 1, rue de Varembe, Geneva, at the price of Sw. Fr. 4.50 per copy, plus postage for Publication 56-1 B, and of Sw. Fr. 12.— per copy, plus postage for Publication 71 A.

International Telecommunication Union

The I.T.U. has just published the first edition of the :

1. — *International Frequency List.* This List replaces the Radio Frequency Record and has been published in the form described in Appendix 9 to the Radio Regulations (Geneva, 1959).

This first edition contains particulars of the frequency assignments appearing in the Master International Frequency Register on 1 May, 1961. It is kept up to date by quarterly recapitulatory supplements.

The document comprises a preface and three volumes. The preface is published separately in English, Spanish, and French, Volume III appears in four separate booklets which can be delivered individually. Titles and headings in Volumes I to III are in English, Spanish, French, Russian, and Chinese.

Sales prices are as follows :

<i>Preface</i> to the three volumes, in English, Spanish, or French	10.— Swiss francs
<i>Volume I.</i> — Frequency Assignments in the Bands between 10 and 5,950 kc/s	85.— Swiss francs
<i>Volume II.</i> — Frequency Assignments in the Bands between 5,950 and 28,000 kc/s	100.— Swiss francs

<i>Volume III. Part A.</i> — Frequency Assignments in the Bands between 28 Mc/s and 50 Mc/s, excluding broadcasting stations	10.— Swiss francs
<i>Volume III. Part B.</i> — Frequency Assignments in Region I in the Bands between 50 and 40,000 Mc/s, and Frequency Assignments to Region I broadcasting stations between 28 and 50 Mc/s	22.— Swiss francs
<i>Volume III. Part C.</i> — Frequency Assignments in Region 2 in the Bands between 50 and 40,000 Mc/s	19.— Swiss francs
<i>Volume III. Part D.</i> — Frequency Assignments in Region 3 in the Bands between 50 and 40,000 Mc/s, and frequency assignments to Region 3 broadcasting stations between 28 and 50 Mc/s	8.50 Swiss francs

The I.T.U. has also published :

2. — The *List of International Telephone Routes*, 1962.

This list is published in accordance with Article 3, paragraph 5 (2) and Article 44 of the Telephone Regulations (Geneva, 1958), with an eye to the recommendations issued by the C.C.I.T.T.

The list comprises six booklets, and appears in a single three language edition (English, Spanish and French). The cost of one set of six booklets will be 17.05 Swiss francs, but the booklets can be obtained separately, as follows :

Booklet I : List of routes in Europe	8.— Swiss francs
Booklet II : List of routes in Africa	1.85 Swiss francs
Booklet III : List of routes in America	2.20 Swiss francs
Booklet IV : List of routes in Asia	1.60 Swiss francs
Booklet V : List of routes in Oceania	— .55 Swiss francs
Booklet VI : List of intercontinental routes	2.85 Swiss francs

These figures include carriage to any address throughout the world, by ordinary mail.
