

U. R. S. I.

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OBITUARY

Sven Gejer

Mr. Sven Gejer, engineer-in-chief, of the Swedish Telecommunications Administration, died on 30th August last, at the age of 60 years.

In 1927, Sven Gejer, then a new-fledged graduate engineer, entered the service of the Administration, and since that time he has pursued his activities at the Administration's Headquarters, within The Radio Department, where his services have been resorted to for tasks belonging to several branches of radio technique and to various applications of such technique.

At one time he was engaged in the development of the network of radiotelegraph and radiotelephone circuits connecting Sweden with foreign countries, and in designing the Administration's system for controlling the frequencies of radio stations.

In later years he has been entrusted with the management of the Radio Department's division for general radio technique, with its laboratories. He took an active part in international cooperation in the radio field and attended a great number of radio conferences.

During a long succession of years Sven Gejer has devoted much interest and valuable work to the U.R.S.I. (International Radio Scientific Union) and to its Swedish National Committee, where he represented the Telecommunications Administration. He was secretary of the National Committee and chairman of the Swedish sub-committee for wave propagation. He has participated in several of the U.R.S.I.'s general assemblies, the Tokyo assembly, in 1963, being the last occasion.

Sven Gejer was not a man of big words and gestures. It would not have agreed with his high ideals to advertise his own person or his own merits. But we, of the Swedish Administration, who for many years have been in touch with him in our daily work, know

that at all times he was a loyal and untiring collaborator, always ready to place his solid knowledge and his great capacity for work at our disposal. The kind of calm amiability which was so characteristic of him was to us an asset which rendered our collaboration agreeable.

His colleagues of the Swedish Administration regret the too early loss of a noble person and an exceptionally honest friend and fellow worker.

HÅKAN STORKY

* * *

On behalf of U.R.S.I., we wish to express our most sincere condolence to our Swedish Colleagues for the loss they suffered with the death of Mr. Sven Gejer, Secretary of the Swedish National Committee of U.R.S.I.

XV^e Assemblée Générale

Lettre du Président de la Commission V de Radio Astronomie aux Membres Officiels

Cher Collègue,

A la dernière Assemblée Générale de l'U.R.S.I., il a été décidé d'organiser un symposium dans le cadre des séances de la Commission V, au cours de la prochaine Assemblée Générale. Nous vous

1 ^{re} séance	2 ^e séance	3 ^e séance
Antennes	Récepteurs	Etalonnage et Mesures
Dispositifs d'antennes radioastronomiques. Grands miroirs. Changements de phase dans les réseaux. Rôle des ordinateurs dans les techniques de mesure de polarisation	Dispositifs d'entrée à faible bruit de fond. Amplificateurs. Méthodes de corrélation et problèmes à la post-détection. Linéarité dans les récepteurs. Récepteurs à canaux multiples.	Mesures de longueur et de position. Dimensions maximales des antennes en présence de l'atmosphère terrestre. Effets des erreurs dans les systèmes d'antenne. Etalonnages absolus, y compris les mesures du gain des aériens. Mesures de phase. Etalonnage des récepteurs à canaux multiples.

saurions gré de nous faire connaître votre avis sur les propositions suivantes concernant les séances à Munich :

1. Trois des séances scientifiques de la Commission V seront organisées sous forme d'un symposium ;
2. Le symposium aura pour sujet les Techniques d'observation et de mesure en Radio Astronomie ;
3. Vous trouverez ci-avant un projet de liste des sujets qui seront discutés dans le cadre du symposium et nous vous serions obligés de nous faire parvenir vos propositions d'amendement. Pour chaque séance, il y aura un ou deux orateurs dont les contributions auront été sollicitées ; les autres communications seront brèves.
4. Deux séances seront consacrées aux observations radioastronomiques :
 - a) Le soleil et le système solaire,
 - b) Observations galactiques et extra-galactiques.
5. Les séances administratives seront réduites au minimum.

En vous priant de faire parvenir votre réponse au Secrétaire Général de l'U.R.S.I., je vous prie d'agréer, cher Collègue, l'expression de mes sentiments distingués.

W. N. CHRISTIANSEN.

15 septembre 1964.

XVth General Assembly

Letter of the Chairman of Commission V on Radio Astronomy to Official Members

Dear Colleague,

At the last General Assembly of U.R.S.I. it was decided that the meeting of Commission V at the next General Assembly should include a Symposium. We should like to have your opinion on the following proposal for the sessions in Munich :

1. Three of the scientific sessions of Commission V should be in the form of a symposium ;

Session I	Session II	Session III
Antennas	Receivers	Calibration and Measurements
Arrangement of Radio Astronomical Antennas. Large mirrors. Phase changing in arrays. Role of computers in radiotelescopes. Techniques of polarization measurements.	Low Noise Inputs. Amplifiers. Stability problems. Correlation methods and post detector problems. Linearity in receivers. Multichannel receivers.	Measurement of length and position. Maximum size of antennas in earth' atmosphere Effects of errors in antennas. Absolute calibration including gain of antennas and arrays. Phase measurements. Calibration of multichannel receivers.

2. The subject of the symposium should be Radio Astronomy Techniques ;
3. A tentative list of subjects for discussion in the symposium is given above (Additions and alterations are invited). There will be one or two invited speakers for each session. Other contributions will be brief.
4. There should be two sessions on radioastronomical observation :
 - (a) The sun and solar system,
 - (b) Galactic and extra-galactic observations.
5. Administrative sessions should be reduced to a minimum.

Your reply should be sent to the Secretary General of U.R.S.I.

Yours sincerely,
W. N. CHRISTIANSEN.

September 15, 1964.

1966 General Symposium on Solar Terrestrial Physics

Yugoslav Organizing Committee

The Yugoslav National Committee has appointed the following members to the Yugoslav Organizing Committee for the General Symposium :

Chairman and Symposium arrangement : Dr. Dejan BAJIĆ.

Secretary and financial arrangements : Milan SEDLAR, B. Sc.

Scientific Programme : Dr. Ivan ATANASIJEVIĆ.

Information and Communications : Kosta COMIĆ, B. Sc.

Visits, entertainments and Ladies' Programme : Mrs Mirjana
VUKIĆEVIĆ-KARABIN, B. Sc.

Publications de l'U. R. S. I.

Manuel des Stations Ionosphériques

SUPPLÉMENT

Un supplément au Manuel des Stations Ionosphériques vient de paraître. Ce supplément de 90 pages a été rédigé par G. M. Brown, Secrétaire du Comité de l'U.R.S.I. pour la Coopération Internationale en Géophysique, avec le concours du Prof. R. W. H. WRIGHT et de M. J. W. Beagley.

Le supplément est envoyé gratuitement à tous ceux qui ont renvoyé au Secrétariat Général de l'U.R.S.I. le formulaire encarté dans le Manuel.

Des exemplaires du Manuel sont disponibles au Secrétariat Général de l'U.R.S.I. au prix de \$ 16.00 (y compris le supplément et les frais de port). Une réduction est accordée aux commandes faites par les Comités Nationaux.

Ionospheric Stations Manual

SUPPLEMENT

A supplement to the Ionospheric Stations Manual has been issued. This 90 page supplement has been edited by Mr. G. M. Brown, Secretary of the U.R.S.I. Committee for International Cooperation in Geophysics, with the assistance of Prof. R. W. H. Wright and of Mr. J. W. Beagley.

The supplement is sent free of charge to all those who have sent to the U.R.S.I. General Secretariat the formulaire inserted in the Manual.

Copies of the Manual are available at the General Secretariat of U.R.S.I. at the price of \$ 16.00 (postage and supplement included). Rebate for orders coming through National Committees.

Balth. van der Pol Gold Medal for Scientific Radio

Our Past President, Dr. R. L. Smith-Rose, has published in *Nature* (Vol. 203, No. 843, July 1964, pp. 359-60) a very comprehensive summary of the proceedings of the evening session held during the last General Assembly to honour the memory of the late Prof. Dr. Balth. van der Pol, who had devoted an important part of his numerous activities to the growth of U.R.S.I.

It should be recalled that one of the main features of the evening was the presentation of the first van der Pol Gold Medal.

The Proceedings of this special meeting are recorded in full in a volume recently published (June 1964) under the title *Van der Pol Memorial Lecture 1963*, by the Secretary General of U.R.S.I.

We quote the last sentence of Dr. Smith-Rose's paper : « The production of this little volume is excellent in every way ; and it forms a worthy memorial to the achievements of U.R.S.I. and the part played in them by the late Prof. Dr. van der Pol ».

* * *

Copies of the « Van der Pol Memorial Lecture » are available at the General Secretariat of U.R.S.I., at the price of \$ 1 per copy (postage included).

National Committees

Austria

OFFICIAL MEMBERS

- Commission I on Radio Measurements and Standards : Dipl. Ing. Walter STIEFLER, Bundesamt für Eich- und Vermessungswesen, Wien XVI, Arltgasse 35.
- Commission II on Radio and Troposphere : *ad. interim* : Prof. Dr. Ferdinand STEINHAUSER, Zentralanstalt für Meteorologie und Geodynamik in Wien, Wien XIX, Hohe Warte 38.
- Commission III on the Ionosphere : Prof. Dr. Otto BURKARD, Institut für Meteorologie und Geophysik der Universität Graz, Graz, Halbärthstrasse 1, Steiermark.
- Commission IV on the Magnetosphere : Prof. Dr. Max TOPERCZER, Institut für Meteorologie und Geophysik der Universität Wien, Wien IX, Boltzmannngasse 5.
- Commission V on Radio Astronomy : Prof. Dr. Josef HOPMANN, Astronomisches Institut Wien, Wien XVIII, Türkenschanzstrasse 17.
- Commission VI on Radio Waves and Circuits : Prof. Dr. Ernst LEDINEGG, Institut für theoretische Physik der Technischen Hochschule Graz, Graz, Rechbauerstrasse 12, Steiermark.
- Commission VII on Radio Electronics : Prof. Dr. Herbert KÖNIG, Institut für Schwachstromtechnik der Technischen Hochschule Wien, Wien IV, Karlsplatz 13.

Brazil

CONSTITUTION OF A NATIONAL COMMITTEE

We have the pleasure to inform our readers that the Brazilian Research Council has constituted a Brazilian National Committee

for U.R.S.I. under the name of Grupo de Organizaçao da Comisao Nacional de Estudos Espaciais (G.O.C.N.A.E.).

The membership of the Committee is :

- Col. Almyr MAURICIO,
- Cap. Fernando de MENDONÇA,
- Cmt Joao BOTELHO MACHADO,
- Dr. Luis de GONZAGA BEVILACQUA,
- Ten. Cel. Sergio SOBRAL de OLIVEIRA.

Address : G.O.C.N.A.E., Conselho Nacional de Pesquisas, Avenida Marechal Camara, 350-6º andar, Rio de Janeiro, Estado da Guanobara.

India

PROGRESS REPORT OF THE RADIO PROPAGATION UNIT-NATIONAL PHYSICAL LABORATORY

The radio Propagation Unit which serves as the Secretariat of the Indian National Committee of U.R.S.I. and is involved in the activities of the U.R.S.I. Committee on Space Radio Research, the Inter-Union Frequency Allocation Committee (I.U.C.A.F.) and the International World Day and Ursigram Service (I.U.W.D.S.), has issued its progress reports for 1960-1963. The Volume contains the following main topics :

1. Ionospheric Physics : Vertical incidence sounding, equatorial ionosphere, low frequency propagation.
2. Radio Propagation Service : Data coordination, sunspot number prediction, ionospheric prediction, forecasting techniques, associate Regional Warning Centre.
3. Aeronomy : D region physics, ionospheric parameters, layer formation, ionospheric dynamics, lunar tides.
4. Radioastronomy : riometers, scintillation of radio stars, solar radiometer.
5. Space research : atmospheric densities, satellite beacon experiments for ionospheric research, rocket soundings of the ionosphere.
6. Interdisciplinary studies : radio detection of nuclear explosions, radio patrol of solar flares, I.Q.S.Y. programme.

Japan

INTERNATIONAL CONFERENCE ON MICROWAVES, CIRCUIT THEORY AND INFORMATION THEORY

Tokyo, September 1964

Our President, Prof. I. Koga, delivered the following greetings address at the Opening Session of the Conference which was sponsored by U.R.S.I. :

Dr. Yagi, Dr. Niwa, Dr. Morita, Dr. Kobayashi, Dr. Tomonaga, Dr. Yonezawa ⁽¹⁾, Ladies and Gentlemen, it is a great pleasure and honor for me to give a greeting on behalf of the International Scientific Radio Union, but I am afraid many of you may not necessarily know what is the International Scientific Radio Union and why I am invited to give an address on behalf of the Union.

The International Scientific Radio Union, abbreviated U.R.S.I., from the French « Union Radio-Scientifique Internationale », is one of the fourteen International Scientific Member Unions of the International Council of Scientific Unions, briefly called I.C.S.U. The I.C.S.U. and U.N.E.S.C.O., the United Nations Educational, Scientific and Cultural Organization, concluded a formal agreement between them immediately upon the formation of U.N.E.S.C.O. in 1946, and U.N.E.S.C.O. recognized I.C.S.U. as providing a natural and appropriate form for the international organization of science and looked upon I.C.S.U. as being their coordinating and representative body.

Returning to U.R.S.I., this Union was established in 1913 and celebrated its Golden Jubilee on the occasion of the XIVth General Assembly in Tokyo last year. The secretariat is in Brussels.

The aims of U.R.S.I. are :

- (1) to promote international cooperation in the scientific study of radio,

⁽¹⁾ Dr. H. YAGI and Dr. Y. NIWA are honorary members of the I.E.C.E. of Japan and recipients of Cultural Medals (top academic decorations in Japan). Dr. K. MORITA is the Chairman of the Organizing Committee, Dr. K. KOBAYASHI is the President of the Institute of Electrical Communication Engineers of Japan, Dr. S. TOMONAGA is the President of the Science Council of Japan, and Dr. S. YONEZAWA is the President of the Conference.

- (2) to encourage and aid in the organization of radio research requiring cooperation on a large scale,
- (3) to promote the establishment and use of common methods and standards of radio measurements, and
- (4) to encourage and aid the discussion and dissemination of the results of these activities.

These objectives are pursued on both the international and the national levels. Internationally, the Union holds meetings, called General Assemblies, usually at three year intervals. These last about two weeks, and are attended by the Delegates nominated by the National Committees of the member countries, which now number more than thirty. I am very happy to add that most of your countries are member countries.

The General Assemblies are devoted principally to the review of the latest developments in Radio Science since the preceeding Assembly, and to make resolutions and recommendations on projects for the future.

The scientific work of U.R.S.I. is carried forward on a continuing basis by permanent international bodies called Commissions. They conduct continuous studies of the major fields of radio research.

The Union is also very keen to encourage specialized symposia or conferences during the period between its General Assemblies. Thus, the Union expressed at the last General Assembly the great interest which it had in this Conference. I hope and expect that this Conference will be very successful and fruitful for the mutual development in the fields concerned. Incidentally the Union would be most grateful if a short report on this Conference is provided for publication in the *U.R.S.I. Information Bulletin*. This will be not only very helpful to the activities of U.R.S.I. but also very effective in contributing to the dissemination of the fruitful results of this Conference throughout the world.

It is almost needless to say that this kind of Conference is very profitable not only for the interchange of the «hot» results of research, for the mutual discussions among the people interested, for the promotion of friendship among people in the same field, but also for the opportunity to reach an understanding of the different way of life, manners and culture of the host country. Let us take a few examples. You will see that every Japanese bows at the beginning and at the end of his or her address, fans

are daily necessities for gentlemen rather than mere accessories for ladies. If you ask « You don't smoke? », the reply will sometimes be « yes » but with the meaning of « Yes, you are right. I DO NOT smoke ». You must be careful, since this kind of difference will sometimes be confusing in the course of discussions.

As I realize that the shorter the wavelength of my address the more it will be welcomed, I shall not continue my remarks any further.

In conclusion again sincerely hope that this Conference will be fruitful and enjoyable, that your sejour is so comfortable and worthwhile and that like us in Japan you will look forward to the Olympic Games which are to be played here about a month from now.

Thank You.

Sweden

OFFICIAL MEMBERS

Commission I on Radio Measurements and Standards : Mr. P. O. LUNDBOM, Research Institute of National Defence, Div. 3, Stockholm 80.

Commission II on Radio and Troposphere : Mr. F. EKLUND, Research Institute of National Defence, Div. 3, Stockholm 80.

Commission III on the Ionosphere : vacant.

Commission IV on the Magnetosphere : vacant.

Commission V on Radio Astronomy : Prof. O. E. H. RYDBECK, Chalmers Institute of Technology, Gibraltarsgatan 5 G, Gothenburg.

Commission VI on Radio Waves and Circuits : Dr. B. JOSEPHSON, Research Institute of National Defence, Div. 3, Stockholm 80.

Commission VII on Radio Electronics : Prof. B. AGDUR, Royal Institute of Technology, Valhallavägen 79, Stockholm 70.

U. S. A.

1964 FALL U.R.S.I. MEETING

**Preliminary Programme of the Joint Meeting,
U. S. National Committee, U.R.S.I., and
Institute of Electrical and Electronics Engineers
Oct. 12-14, 1964, Urbana, Illinois**

COMBINED SESSION — ALL COMMISSIONS

« *Electroacoustic Waves* » — Monday, October 12.

1. A guided-wave approach to electroacoustic wave propagation, by Nathan MARCUVITZ.
2. Radar observations of electroacoustic waves in the ionosphere, by K. L. BOWLES.
3. Antennas and Probes in the ionosphere, by J. A. FEJER.
4. Electrostatic plasma wave propagation, by G. S. KINO.

COMMISSION 2. — RADIO PROPAGATION IN NON-IONIZED MEDIA

Session 2-1 : « *Tropospheric Propagation — Theories and Experiments* ». Monday, October 12.

1. Tentative interpretation of phase measurements on a transhorizon path, by I. H. GERKS.
2. Phase and amplitude measurement on a UHF transhorizon path, by C. M. BEAMER.
3. A more accurate solution of the diffraction problem in an exponentially stratified atmosphere, by I. H. GERKS.
4. Results of transmission loss measurements in the 20-100 Mc/s range over irregular terrain using low antennas, by A. P. BARSIS.
5. Convergence factor for reflections from a horizontally stratified atmosphere, by T. J. Carroll.
6. Microwave attenuation due to precipitation as inferred from weather radar measurements, by M. L. STONE.

Session 2-2 : « *Planetary Scattering and Satellite Communication* » — Tuesday, October 13.

1. Depolarization and surface roughness, by H. S. HAYRE.
2. Communication experiments with Echo II, by S. L. ZOLNAY.
3. Radar observations of Venus at 3.6 centimetres, by David KARP.
4. Interpretation of radar measurements from the moon and earth, by L. M. SPETNER.

5. A precision planetary range-tracking radar, by Dr. R. C. TITSWORTH.
6. Communication satellite system degradation due to rain, by N. E. FELDMAN.

Session 2-3 : « Antennas in Dissipative Non-Ionized Media » — Tuesday, October 13.

1. The driving-point impedance of a small prolate spheroidal antenna immersed in a conducting medium, by W. T. COWAN, R. D. KELLY and R. H. WILLIAMS.
2. Radiation fields from a horizontal electric dipole in a stratified conducting medium, by A. W. BIGGS and H. M. SWARM.
3. The circular loop antenna near the interface between a dissipative medium and air, by Keigo IZUKA.
4. Characteristics of the HF annular slot antenna in a dissipative media, by Essad TAHAN.
5. Conductivity and radio propagation in the earth's crust, by B. ORANGE, Philip NELSON and Thomas CANTWELL.

COMMISSION 3 — IONOSPHERIC RADIO

Session 3-1 : « F2-Region Measurements » — Monday, October 12.

1. Measurements of electron content with Syncom II, by O. K. GARRIOTT, F. L. SMITH III and A. da ROSA.
2. Determination of the solar ionizing flux from sunrise measurements, by A. A. GRAN.
3. Analysis of second-order corrections applied to radio beacon satellites, by N. D. FOLTZ.
4. Faraday rotation measurements of decametric wavelength radiation from the planet Jupiter, by R. M. STRAKA and D. GAUNT.
5. Ionospheric electron content measurements using lunar reflections at 150.6 MC, by Harold D. WEBB and Fred B. DANIELS.

Session 3-2 : « The Topside Ionosphere » — Tuesday, October 13.

1. The structure of the topside equatorial ionosphere, by T. E. VAN ZANDT, R. B. NORTON and H. RISHBETH.
2. Statistical analysis and discussion of the electron density distributions at the 1000 km surface, by T. I. DAYHARSH and W. W. FARLEY.
3. Middle latitude changes in topside electron density through a magnetic storm, by Patricia L. MILIC.
4. The N.A.S.A. Ames research center I.Q.S.Y. programme for the reduction of Alouette topside ionograms, by L. COLIN.
5. The electron density at the Alouette I orbit in mid-latitudes, by Michael RYCROFT.

6. Structure and variation of the topside ionosphere observed from Fort Monmouth between September 1963 and January 1964, by P. R. ARENDT and A. PAPAYOANOU.

Session 3-3 : « Ionospheric Propagation » — Tuesday, October 13.

1. A frequency-shift pulse backscatter sounding technique, by B. R. FENWICK, G. JACOBS and S. KESSLER.
2. Ionospheric radio observations on two closely spaced frequencies, by Kurt TOMAN.
3. Sunspot cycle dependence of ionospheric storms, by R. J. CORMIER and K. L. SMALLWOOD.
4. Effects of rocket outgassing on RF experiments, by W. PFISTER and J. C. ULWICK.
5. Unusual HF propagation modes as implied by observations of transmissions from the U. S. S. R. and Red China, by Walter F. BAIN.
6. Persistent field-aligned ionization observable at 50 Mc near Hawaii, by Walter F. BAIN.

Session 3-4 : « Sporadic-E, Turbulence and Drifts » — Wednesday, October 14.

1. The wind shear theory of sporadic E, by W. I. AXFORD and D. L. CUNNOLD.
2. Validity of three-station methods of determining ionospheric motions, by R. RAGHAVARAO and C. O. HINES.
3. Some evidence of sporadic E layer tilt in the temperate zone, by R. W. HARRIS and C. CLARK.
4. Dielectric permittivity of turbulent magneto ionic media, by Leonard S. TAYLOR.
5. Zenith angle dependence of radio star scintillations for an extended incoherent source, by Don PARKER.

Session 3-5 : « D-Region Measurements » — Wednesday, October 14.

1. Distribution of D region echoes subsequent to high latitude nuclear bursts, by Glenn M. STANLEY.
2. General method of solving the full-wave equations with mode-coupling and its application to LF propagation in the ionosphere, by Y. INOUE and S. HOROWITZ.
3. A mathematical technique for the conversion of wave interaction data to D-region electron density profiles, by F. V. HELLRICH and A. J. FERRARO.
4. An integrated experiment for the study of the aeronomy of the D- and E-regions of the ionosphere, by S. A. BOWHILL and G. G. KLEIMAN.

5. Variation of the VLF conversion coefficient during the sunrise transition, by C. F. SECHRIST, Jr. and J. M. MUSSER.
6. A radio propagation experiment using a rocket-borne receiver, by H. W. KNOEBEL and D. SKAPERDAS.

COMMISSION 4. — MAGNETOSPHERIC RADIO

Session 4-1 : « Whistlers and VLF » — Monday, October 12.

1. Modes in columns of field aligned ionization, by B. A. LIPPMAN, P. J. WYATT and V. A. ERMA.
2. Instabilities in the whistler mode caused by velocity anisotropies in fast-particle fluxes, by Richard I. MILLER.
3. Anisotropic electron velocity distribution for cyclotron absorption of whistlers and VLF emissions, by H. Guthart.
4. Cerenkov and cyclotron radiation as VLF emission sources, by Victor Mansfield.
5. Generation of whistler waves by a helical electron beam, by J. NEUFELD and H. WRIGHT.
6. Lower hybrid resonance emissions, by N. M. BRICE and R. L. SMITH.
7. Maximum duration of quasi-constant frequency discrete emissions, by N. BRICE.

Session 4-2 : « The Topside Ionosphere » — Tuesday, October 13 ;
Joint session with Commission 3.

Session 4-3 : « Magnetospheric Properties » — Tuesday, October 13.

1. A study of the effective electron cross-sections and temperatures in the high latitude ionosphere, by L. A. MAYNARD and H. L. WERSTIUK.
2. The effects of the 20 July 1963 solar eclipse on the F-region, by J. V. EVANS.
3. Ionospheric temperatures at sunspot minimum, by J. E. GEISLER and S. A. BOWHILL.
4. Correlation of auroral absorption and precipitated electrons, by D. H. JELLY and I. B. McDIARMID.

Session 4-4 : « Magnetospheric Physics » — Wednesday, October 14.

1. Refractive indices for multicomponent plasmas, by R. L. SMITH and N. BRICE.
2. Electron precipitation through VLF and ULF turbulence, C. F. KENNEL and H. E. PETSCHER.
3. The transfer of electrostatic fields from the magnetosphere to the ionosphere, by George C. REID.
4. On the orientation of the high-latitude DS current system, by C. O. HINES and A. NISHIDA.
5. Magnetohydrodynamic waves in a plasma slab bounded by a neutral gas, by Elisabeth A. COOPER.

COMMISSION 6. — RADIO WAVES AND TRANSMISSION OF INFORMATION

Session 6-1 : « Antennas » — Monday, October 12.

1. The driving-point impedance of a symmetrically driven satellite antenna in isotropic space, by R. H. WILLIAMS and T. N.-C. WANG.
2. A theoretical treatment of the Yagi array, by I. Larry MORRIS.
3. The theoretical basis for approximate solutions for the near fields of log-periodic antennas, by Richard B. KEBURTZ.
4. Complex wave analysis of the backfire bifilar helical antenna, by P. W. KLOCK and R. MITRA.
5. The traveling-wave V antenna, by Keigo IZUKA.
6. Currents, charges and near fields of cylindrical antennas, by R. W. P. KING and T. T. WU.
7. The cylindrical antenna with non-reflecting load, by T. T. WU and R. W. P. KING.

Session 6-2 : « Arrays » — Tuesday, October 13.

1. On space-tapered aperiodic arrays, by S. W. LEE and Y. T. LO.
2. Optimally spaced antenna arrays, by S. L. SHIH.
3. Space-frequency equivalence for correlation arrays and linear additive arrays, by W. G. JAECKLE.
4. Grating plateaux of planar nonuniformly spaced arrays, by Y. L. CHOW and J. L. YEN.
5. A semi-broadband quadrature array, by Alphcnse BUSH.
6. Modeling program for development of a super power multiplex-steerable short-wave antenna system, by C. E. SMITH, C. S. BIDLACK, R. H. SUBLETT and F. D. BOLOTIN.
7. An approach for S/N optimization in line arrays, by F.-I. TSENG and D. K. CHENG.

Session 6-3 : « Reflection Phenomena, Codes and Noise » — Tuesday, October 13.

1. On an integral formulation of reflected and transmitted waves from one-dimensional inhomogeneous slabs, by W. J. BYATT and T. N.-C. WANG.
2. Cyclic product codes with variable redundancy, by R. T. CHIEN and D. T. TANG.
3. Some results on the factorization problem, by Thomas KAILATH.
4. Ray tracing methods for analysis of propagation through radomes, by G. TRICOLES.
5. A study of dielectric lenses, by P. L. E. USLENGHI.
6. Transient solutions for a class of diffraction problems, by L. B. FELSEN.
7. The superposition of selected waveguide modes to achieve desirable features in the aperture distribution of dual-polarized tracking radars, by K. J. KEEPING.

Session 6-4 : « Electromagnetic Theory » — Wednesday, October 14.

1. Integrals of the second order linear differential equation, by J. KANE and E. T. SURYNARAYAN.
2. Application of conformal mapping to electromagnetic waves, by F. J. TISCHER.
3. Phase-considerations in the Navy space surveillance system, by M. G. KAUFMAN.
4. Generalized distribution-free coincidence detection procedures, by D. G. LAINIOTIS.
5. Low frequency scattering by a prolate spheroid, by R. E. KLEINMAN and J. S. ASVESTAS.
6. Characteristic values from a new approach to the phase integral method, by K. M. HAGENBUCH.

Session 6-5 : « Antennas and Ionized Media » — Wednesday, October 14.

1. The impedance of a short dipole in a compressible plasma, by K. G. BALMAIN.
 2. Modifications of theories on the excitation of electroacoustic waves, by Ronal W. LARSON.
 3. Radiation from electromagnetic sources in a plasma, by S. R. SESHADRI.
 4. Propagation in non-uniform, gyrotropic media, by S. H. GROSS and L. B. FELSEN.
 5. Impedance of a dipole antenna in a homogeneous magnetosphere, by W. S. AMENT.
 6. Measurements on a plasma sheath, by Daniel J. JACAVANCO.
 7. Radiation from a vertical electrical dipole in a warm plasma above a conducting plane, by R. M. LANGELIER.
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COMMISSIONS AND COMMITTEES

Commission I on Radio Measurements and Standards

RESOLUTIONS ADOPTED BY THE I.A.U. GENERAL ASSEMBLY

Attention of the members of Commission I is drawn to the Resolutions, concerning the radio emissions and time frequency, adopted by the I.A.U. Commission 31 during the recent XIIth General Assembly in Hamburg. As shown by the covering note prepared by Dr. W. Markowitz, Resolutions (1), (3) and (4) have been adopted by the General Assembly. These Resolutions will in due course be printed as Resolutions of the I.A.U. General Assembly No. 6 (a), (b) and (c).

*The following Clarification and Resolutions were adopted on
31 August 1964 by Commission 31*

CLARIFICATION

1. The I.A.U. notes the need for a clarification of the distinction between the two aspects of time, namely, *epoch* (time instant) and *time interval*, and of needs for various scales of time.

2. The epoch of U.T. is determined by the angular position of the Earth about its axis and is required for various scientific and technical purposes and for civil use ; in some cases immediately.

3. A unit of atomic time (A.T.), based upon a quantum transition, is appropriate as the fundamental unit of time interval in physics and has been used in practice as such since 1955. The adoption of a particular transition for the definition of the physical second is the responsibility of the General Conference on Weights and Measures.

4. E.T. is the time appropriate for celestial mechanics, for purposes of which neither the epoch nor unit of time interval need be made available on a current basis.

5. The I.A.U. recognizes the need of physicists for the second of atomic time but emphasizes that there is a continuing requirement for the immediate availability of the epoch of U.T.

6. Thus the need exists for making available by radio emissions both the epoch of U.T. and the unit of A.T. interval. This has been done since 1959.

7. The method of providing both is practicable because :

- (a) the epoch of U.T.2 need be known without immediate correction only to within 0.1 sec., and
- (b) the frequency can be maintained constant with respect to atomic standards for periods of one year or more by a known offset.

In this method coherence between time pulses and carrier frequency is maintained.

8. It is recognized that alternative compromise methods are possible. However, the present system seems best suited to many current requirements.

9. The desirability is recognized of emitting the epoch of U.T.2 and the unit of time without jumps in epoch or offset in frequency.

RESOLUTIONS

The I.A.U. accordingly recommends :

(1) That radio emissions of time and frequency provide both the epoch of U.T.2 and the unit of atomic time interval.

(2) That

(a) the frequency emitted each year shall be

$$F = F_0(1 + s)$$

where F_0 is the nominal frequency and s is the fractional offset.

The conventional reference frequency is

$$\nu = 9\,192\,631\,770 \text{ cps}$$

for the cesium beam. However, if another atomic frequency should be adopted by action of the General Conference on Weights and Measures it would become the reference frequency ;

- (b) the offset, s , shall be $50 n \times 10^{-10}$, where n is a positive or negative integer ;
- (c) jump adjustments in phase shall be exactly 100 milliseconds and shall be made at 0h U.T. on the first of a month ;
- (d) the B.I.H., after conferring with the Observatories concerned, shall give at least a month's advance notice of the offset to be used each year and of step adjustments to be made.

(3) That all time and frequency emissions be coordinated.

(4) That active studies be pursued, in cooperation with the C.C.I.R. and U.R.S.I., which can lead to the adoption of a system of emitting the epoch of U.T.2 and the unit of time interval without jumps in epoch or offsets in frequency, and without losing a known relationship between the frequency and time signals.

(5) The I.A.U. requests the General Secretary to forward copies of these Resolutions and the Clarification to the International Bureau of Weights and Measures, C.C.I.R., U.R.S.I. and I.U.G.G.

Commission III on the Ionosphere

IONOSPHERIC DATA

The World Data Centre C1 (D.S.I.R. Radio Research Station, Slough) has issued the :

« Catalogue of Ionospheric Data received up to 31st January 1964 ».

PROPAGATION IONOSPHERIQUE

L'Union Européenne de Radiodiffusion (U.E.R.) a publié dans le numéro 86-A, août 1964, de la Revue de l'U.E.R. le compte-rendu d'une réunion d'experts sur la propagation ionosphérique (Genève, juin 1964).

Ce même numéro contient un aperçu des travaux d'un groupe de travail chargé de l'établissement de courbes de propagation ionosphérique pour les ondes longues et moyennes, ainsi que l'exposé d'une campagne de mesures en vue de l'étude de la propagation ionosphérique sur le continent africain.

ANTARCTIC RESEARCH

The following are abstracted from the 6th Report to S.C.A.R., prepared by the South African Scientific Committee for Antarctic Research entitled : « South African Antarctic Research Activities 1963 and Activities planned for 1965 ».

STATIONS OCCUPIED IN 1963

Ionosphere

Station	Equipment	Observing schedule	Data
SANAE	Vertical Incidence Ionosonde (modified Cossor Type 7562C).	Ionosphere - soundings at quarter-hourly intervals throughout the year.	« Monthly Bulletin of Ionospheric Characteristics observed at SANAE Base, Antarctica ».
SANAE	Oblique Incidence Ionosonde of local manufacture.	Oblique Incidence pulse transmissions at 10.74 Mc/s from SANAE to Grahamstown, South Africa, at approximately hourly intervals throughout the year.	

Reference : Direction of programme and data processing — Professor J. A. GLEDHILL, Department of Physics, Rhodes University, Grahamstown, South Africa.

ACTIVITIES PLANNED FOR 1965

Ionosphere

Operation of vertical and oblique incidence ionosonde at SANAE will be continued. The operation of the oblique incidence ionosonde will be extended to cover the measurement of 2-way pulse transmission times.

Programme will be directed by Professor J. A. Gledhill, Department of Physics Rhodes University, Grahamstown, South Africa.

PUBLICATIONS

- BAKER, D. C. and GLEDHILL, J. A. — Possible ionospheric effect of a high-altitude nuclear explosion. *J. Geophys. Res.*, Vol. 68, p. 6359, 1963.
- GLEDHILL, J. A. and VAN ROOYEN, H. O. — The South Atlantic geomagnetic anomaly and the radiation belts. In : *Proc. Fifth international Symposium on space technology and science*. Tokyo, 1963 (in press).
- RHODES UNIVERSITY, Grahamstown, Department of Physics. Monthly bulletin of ionospheric characteristic observed at SANAE base, Antarctica Monthly. Jan.-1963 Oct. 1963 (later issues in preparation).

SOUTH AFRICAN MEMBER OF THE S.C.A. WORKING ON
UPPER ATMOSPHERE PHYSICS

Upper Atmosphere Physics : Mr. R. W. VICE, National Institute for Telecommunications Research, University of the Witwatersrand, Milner Park, Johannesburg.

INDICES D'ACTIVITÉ SOLAIRE
POUR LA PROPAGATION IONOSPHERIQUE

(Extrait du *Journal des Télécommunications*, Vol. 31, n° 8,
août 1964)

Conformément à la Résolution 4 du Comité consultatif international des radiocommunications (C.C.I.R.), le secrétariat spécialisé du C.C.I.R. a préparé les tableaux suivants concernant les indices fondamentaux de la propagation ionosphérique (Avis 371 et Rapport 246 du C.C.I.R.).

VALEURS OBSERVÉES

● R_{12} (moyenne glissante sur douze mois du nombre de taches solaires) :

Année	Mois	1	2	3	4	5	6	7	8	9
1963		29	30	30	29	29	27	28	27	27

● I_{F_2} (indice ionosphérique) :

Année	Mois	1	2	3	4	5	6
1964		9(2)*	2(2)*	20(2)*	14(2)*	1(2)*	—3(3)

● Φ (flux du bruit solaire moyen mensuel) :

Année	Mois	1	2	3	4	5	6
1964		74	76	75	73	69	69

PRÉVISIONS POUR LES MOIS A VENIR (1^{er} AOUT 1964)** :

● R_{12}

Année	Mois	7	8	9	10	11	12
1964		10	9	8	7	6	5

● $I_{F_2}^{***}$

Année	Mois	6	7	8	9	10	11	12
1964		4	3	2	1	0	—1	(—2)

(*) Les chiffres entre parenthèses indiquent le nombre de valeurs de foF_2 qui ne sont pas encore parvenues au secrétariat du C.C.I.R. et dont on n'a donc pas tenu compte dans le calcul de l'indice I_{F_2} . Pour plus de détails, voir le numéro du *Journal des télécommunications* (avril 1964), page 119.

Par rapport aux données contenues dans le Rapport 246 du C.C.I.R., deux stations de sondages ionosphériques ont cessé de fonctionner — celles de Puerto-Rico (en juin 1963) et de Fairbanks (en novembre 1963). Les valeurs de I_{F_2} contenant entre parenthèses le chiffre (2) sont donc à partir du mois de novembre 1963 les valeurs définitives de l'indice I_{F_2} .

(**) Renseignements obligeamment fournis par le Prof. WALDMEIER, Observatoire Fédéral de Zurich.

Estimation de l'erreur sur les prévisions de R_{12} : ± 5 .

(***) Renseignements obligeamment fournis par le Department of Scientific and Industrial Research, Radio Research Station, Slough.

La valeur prévue six mois à l'avance est donnée entre parenthèses.

Estimation de l'erreur (en %) sur les prévisions de I_{F_2} :

Mois	6	7	8	9	10	11	12
Max.	+150	+37	+26	+31	+10	+8	+6
Min.	-179	-85	-76	-71	-84	-94	-106

SOLAR INDICES FOR IONOSPHERIC PROPAGATION

(Reprint from *Telecommunication Journal*, Vol. 31, No. 8, August 1964)

In accordance with Resolution 4 of the International Radio Consultative Committee (C.C.I.R.), the Secretariat of this body has produced the following tables, showing the basic indices of ionospheric propagation (C.C.I.R. Recommendation 371 and Report 246).

PARAMETERS

● R_{12} (smoothed mean, over twelve months, of sunspots observed) :

Year	Month	1	2	3	4	5	6	7	8	9
1963		29	30	30	29	29	27	28	27	27

● I_{F_2} (ionospheric index) :

Year	Month	1	2	3	4	5	6
1964		9(2)*	2(2)*	20(2)*	14(2)*	1(2)*	-3(3)

(*) The figures in brackets represent the number of figures for foF_2 which have not yet reached the C.C.I.R. Secretariat, and have been overlooked in calculation of I_{F_2} . For further detail, see the *Telecommunication Journal*, April 1964, page 119.

With regard to the data contained in C.C.I.R. Report 246 two ionospheric sounding stations have ceased to operate — Puerto-Rico (in June 1963) and Fairbanks (in November 1963). The values of I_{F_2} that include the figure (2) in brackets are therefore as from the month of November, 1963, the definitive values for I_{F_2} .

● Φ (mean monthly solar noise flux) :

Year	Month	1	2	3	4	5	6
1964		74	76	75	73	69	69

FORECASTS FOR THE NEXT FEW MONTHS (1 AUGUST, 1964) : **

● R_{12}

Year	Month	7	8	9	10	11	12
1964		10	9	8	7	6	5

● $I_{F_2}^{***}$

Year	Month	6	7	8	9	10	11	12
1964		4	3	2	1	0	-1	(-2)

Estimate of the error (%) in I_{F_2} predictions :

Month	6	7	8	9	10	11	12
Max.	+150	+37	+26	+31	+10	+8	+6
Min.	-179	-85	-76	-71	-84	-94	-106

(**) Data kindly supplied by Prof. WALDMEIER, Federal Observatory, Zurich.

Estimated error in forecast of R_{12} : ± 5 .

(***) Data kindly supplied by the Department of Scientific and Industrial Research, Radio Research Station, Slough.

The figure in brackets is the figure forecast six months in advance.

INTERNATIONAL SYMPOSIUM ON FLUID MECHANICS
IN THE IONOSPHERE (JULY 1959)

Copies of the Proceedings of the symposium are available at the General Secretariat, free of charge.

Besides the minutes of the eleven sessions held during the symposium, the Volume, reprinted from the *Journal of Geophysical Research*, contains the following papers :

- Constitution of the atmosphere at ionospheric levels, M. NICOLET.
Ionizations and drifts in the ionosphere, J. A. RATCLIFFE.
The natural occurrence of turbulence, R. W. STEWART.
Dynamics of the upper atmosphere, P. A. SHEPPARD.
Visual and Photographic observations of meteors and noctilucent clouds, P. M. MILLMAN.
Measurements of turbulence in the 80 to 100 km region from the radio echo observations of meteors, J. S. GREENHOW and E. L. NEUFELD.
Outline of some topics in homogeneous turbulent flow, S. CORRSIN.
The motion of fluids with density stratification, R. R. LONG.
Radioscattering in the lower ionosphere, H. G. BOOKER.
Large-scale movements of ionization in the ionosphere, D. F. MARTYN.
Scattering of waves and microstructure of turbulence in the atmosphere, A. M. OBOUCKHOV.
Effect of a magnetic field on turbulence in an ionized gas, J. W. DUNGEY.
Note on some observational characteristics of meteor radio echoes, P. M. MILLMAN.
On the structure of turbulence in electrically neutral, hydrostatically stable layers, H. A. PANOFSKY.
On the similarity of turbulence in the presence of a mean vertical temperature gradient, A. S. MONIN.
On the spectrum of electron density produced by turbulence in the ionosphere in the presence of a magnetic field, I. D. HOWELLS.
Evidence of irregularities in the ionosphere, B. NICHOLS.
Geomorphology of spread F on characteristics of equatorial spread F, R. W. H. WRIGHT.
Eddy diffusion and its effect on meteor trails, J. S. GREENHOW.
Interpretation of certain ionospheric motions in terms of atmospheric waves, C. D. HINES.
Magnetohydrodynamics of the small - scale structure of the F region, J. P. DOUGHERTY.
Electrodynamic stability of a vertically drifting ionospheric layer, J. A. FEJER.

- Effect of density variation on fluid flow, Chia-Shun YIH.
Turbulence in shear flow with stability, A. S. MONIN.
Turbulent spectra in a stably stratified atmosphere, R. BOLGIANO, JR.
Relation of turbulence theory to ionospheric scatter propagation experiments, A. D. WHEELON.
Traveling disturbances originating in the outer atmosphere, K. BIBLAND and K. RAWER.
On the influence of the magnetic field on the character of turbulence in the ionosphere, G. S. GOLITSYN.
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**Sous-Commission Permanente IV. A. —
Bruit Radioélectrique d'Origine Terrestre**

**Permanent Sub-Commission IV. A.
Radio Noise of Terrestrial Origin**

COMPOSITION — MEMBERSHIP

Président : Prof. Dr. A. KIMPARA, Research Institute of Atmospheric Physics, Nagoya University, Toyokawa, Aichi, Japan.

Membres : Mr. G. McK. ALLCOCK,

Members Mr. H. E. DINGER,
Dr. F. HORNER,
Prof. E. A. LAUTER,
Dr. Y. I. LIKHTER,
Prof. J. LUGEON,
Mr. R. Rivault,
Dr. WEBSTER.

Commission V on Radio Astronomy

**SYMPOSIUM ON THE GALAXY
AND THE MAGELLANIC CLOUDS**

Canberra and Sydney, March 1963

The Australian Academy of Science has issued the Proceedings of the Symposium of the Galaxy and the Magellanic Clouds organized under the auspices of I.A.U. and U.R.S.I.

The book, of 404 pages, is available from the Australian Academy of Science, Gordon Street, Canberra City; A.C.T. Australia, and orders accompanied by a cheque or bank draft should be addressed to the Executive Secretary of the Academy. The price of \$ 15.00 U.S. (£ 6.10 Australian, £ 5.5 sterling) (reduced price of \$ 9 for I.A.U. members) covers postage by sea. If air mail postage is required an appropriate amount should be added to the remittance.

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1. Structure of the Galaxy, by J. H. OORT.
2. Ages and kinematics of clusters, by O. J. EGGEN.
3. Space distribution of 156 galactic star clusters and of 61 HII regions, by W. BECKER.
4. Studies of NGC 6067 and IC 2944, by A. D. THACKERAY.
5. A discussion of NGC 4755 and some other young clusters in the Galaxy and the Magellanic Clouds, by M. W. FEAST.
6. The total brightness of galactic clusters, by W. BUSCOMBE.
7. Flash stars in stellar aggregates, by G. HARO.
8. Galactic evolution and the two-colour diagram, by R. H. STOY.
9. Measurements of neutral hydrogen in galactic star clusters, by R. D. DAVIES.
10. Planetary nebulae in the central region of the Galaxy, by L. PEREK.
11. Spectrophotometry of 14 southern planetary nebulae, by L. H. ALLER and D. J. FAULKNER.
12. The Scorpio-Centaurus association, by A. BLAAUW.
13. Preliminary results from spectroscopic observations of faint B stars, by R. M. PETRIE.
14. Faint southern B star velocities, by A. D. THACKERAY.
15. The Me variables and galactic structure, by M. W. FEAST.
16. Galactic structure and rotation from cepheids, by R. P. KRAFT and M. SCHMIDT.
17. The hydrogen lines as luminosity criteria in early-type stars, by J. A. GRAHAM.
18. The region of NGC 6522, by Sir Richard WOOLLEY.
19. The interpretation of recent 21 cm line data in terms of large-scale galactic structure, by G. WESTERHOUT.
20. High-resolution studies of the galactic equator region, by F. J. KERR.

21. Large-scale structure and kinematics of the Galactic System, by B. LINDBLAD.
22. Comparison of HI spiral pattern with optical structure of other galaxies, by G. de VAUCOULEURS.
23. Non-circular motions in the Galaxy as exhibited by very young stars, by H. F. WEAVER.
24. A high resolution study of M31, by B. F. BURKE, K. C. TURNER and M. A. TUVE.
25. The radio continuum emission from the Galaxy, by B. Y. MILLS.
26. Some new observations relating to galactic radio sources and background structure, by E. R. HILL.
27. Observations de restes de supernovae à la Station de Radioastronomie de Nançay, by A. BOISCHOT and J. LEQUEUX.
28. Radio studies of HII regions and galactic structure, by M. M. KOMESAROFF and G. WESTERHOUT.
29. Superassociations in distant galaxies, by V. A. AMBARTSUMIAN.
30. Large HI clouds in the Galaxy, by R. X. MCGEE.
31. A large high velocity cloud at $l^{\text{II}} = 41^{\circ}$, $b^{\text{II}} = -15^{\circ}$, by J. H. OORT.
32. A high-resolution study of the outer parts of the Galaxy, by B. F. BURKE, K. C. TURNER and M. A. TUVE.
33. The magnetic field of the Galaxy determined from the Zeeman splitting of the 21-cm hydrogen line, by R. D. DAVIES.
34. Observation and interpretation of optical and radio polarization, by G. WESTERHOUT.
35. Radio polarization effects in the Galaxy, by F. F. GARDNER.
36. An outline of the spiral structure of the Southern Milky Way, by B. J. BOK.
37. Radial velocities as a guide to spiral structure, by A. D. THACKERAY.
38. On the comparison of spiral structure as delineated by gas and by stars, by H. F. WEAVER.
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40. A high-resolution 10-centimetre survey of the galactic centre region and spectral characteristics of the region, by B. F. C. COOPER and R. M. PRICE.
41. The structure of the galactic nucleus, by Y. N. PARIJSKY.
42. Recent observations at Dwingeloo of the central region of the Galactic System, by J. H. OORT.
43. Hydrogen motions in the central region of the Galaxy, by B. F. BURKE and M. A. TUVE.
44. Hydrogen-line observations of the galactic centre region, by F. J. KERR.
45. High-resolution observations of the galactic centre at 1420 Mc/s in the continuum and in the neutral hydrogen line, by N. F. RYZHKOV, T. M. EGOROVA, I. V. GOSSACHINSKY and B. V. BYSTROVA.

46. Interpretation of velocity distribution of the inner regions of the Galaxy, by G. de VAUCOULEURS.
47. Distribution des vitesses radiales des régions HII dans la direction du centre galactique, by G. COURTÈS.
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SECTION II : THE MAGELLANIC CLOUDS.

50. The role of the Magellanic Clouds in the understanding of galaxies, by H. C. ARP.
51. Reconnaissance d'étoiles appartenant au Grand Nuage de Magellan à l'aide d'un prisme objectif à champ normal, by C. FEHRENBACH.
52. Member stars of the Magellanic Clouds from proper motions, by Sir Richard WOOLLEY.
53. The surface distribution of clusters, planetary nebulae, supergiant M stars, and carbon stars in the Large Magellanic Cloud, by B. E. WESTERLUND.
54. Continuum radio emission from the Magellanic Clouds, by D. S. MATHEWSON and J. R. HEALEY.
55. Notes on the structure of the SMC as observed in 21-cm line radiation from neutral hydrogen, by J. V. HINDMAN.
56. Optical evidence on the kinematics of the Magellanic Clouds, by M. W. FEAST.
57. Comparison of stellar orbits in the Large Magellanic Cloud and in the Galaxy, by L. PEREK.
58. Comparison of the Magellanic Clouds with other irregular barred spirals, by G. de VAUCOULEURS.
59. Comparison of neutral hydrogen in NGC 55 and the LMC, by B. J. ROBINSON and K. J. VAN DAMME.
60. Régions HII dans les Nuages de Magellan et les galaxies proches, by G. COURTÈS.
61. Radio continuum emission from HII regions in the Magellanic Clouds, by D. S. MATHEWSON and J. R. HEALEY.
62. Neutral hydrogen in the Large Magellanic Cloud, by R. X. MCGEE and Janice A. MILTON.
63. Photoelectric spectrophotometry of emission nebulosities in the Magellanic Clouds, by H. R. DICKEL, L. H. ALLER and D. J. FAULKNER.
64. A comparison of the 30 Doradus and η Carinae nebulae, by D. J. FAULKNER.
65. Planetary nebulae and Wolf-Rayet stars in the Magellanic Clouds, by B. E. WESTERLUND.
66. Supergiants in the Magellanic Clouds and in the Galaxy, by Th. WALRAVEN and J. H. WALRAVEN.

67. Spectroscopic work in the Magellanic Clouds : NGC 330 in the SMC, by M. W. FEAST.
68. A young association in the Large Magellanic Cloud, by B. J. Bok.
69. The wing of the Small Magellanic Cloud, by B. E. WESTERLUND.
70. A cluster of intermediate age in the Large Magellanic Cloud, by Sir Richard WOOLLEY.
71. Old and intermediate populations in the Magellanic Clouds, by W. G. TIFFT.
72. The red globular-like clusters in the Magellanic Clouds, by S. C. B. GASCOIGNE.
73. Energy distribution in globular star clusters, by L. H. Aller and D. J. Faulkner.
74. Short-period variables in the Magellanic Clouds, by A. D. THACKERAY.
75. Photoelectric observations of Magellanic Cloud cepheids, by S. C. B. GASCOIGNE.
76. New variables in the Large Magellanic Cloud, by J. Landi DESSY.
77. Review of Magellanic Cloud problems, by A. D. THACKERAY.
Free discussion on problems of the Magellanic Clouds.

Commission VI on Radio Waves and Circuits

PROCEEDINGS OF THE SECOND COLLOQUIUM ON MICROWAVE COMMUNICATION

The first Colloquium on Microwave Communication was held in Budapest in 1959 under the auspices of the Department of Technical Sciences of the Hungarian Academy of Sciences and the Scientific Society of Telecommunication of Hungary. Continuing the need to bring together specialists in microwave radio relay systems a second Colloquium was held in June 1962, again in Budapest, and a third Colloquium is planned to be held in June 1965.

The full proceedings of the Second Colloquium were published in *Acta Technica Academiae Hungaricae* (Vol. 42, Nos. 1-3, 1963) in mixed languages, and an all-English version has now been published separately by the Publishing House of the Hungarian Academy of Sciences (Akadémiai Kiadó, Budapest, 1963). This contains the full text of 30 papers, and abstracts of a further 3 papers, in a 290 pages well illustrated volume.

The papers deal with a wide variety of subjects concerned with microwave radio links. These include discussions of interference, noise, distortion, crosstalk, and bandwidth requirements in various systems; research on the generation of millimetre waves, klystron modulators, microwave ferrite devices, filters, waveguides, and transmission lines; parametric amplifiers and travelling wave tube frequency conversion; and microwave antennas. A number of papers also deal with instruments and measurements for systems.

G. M. BROWN.

Comité des Recherches Radioélectriques dans l'Espace

DOCUMENTATION

L'attention des membres du Comité est attirée sur un article publié dans le *Journal des Télécommunications*, Vol. 31, n° 9, Sept. 1964, 249-255 : « Limites de puissance et procédures de coordination applicables aux bandes de fréquence utilisées en partage pour le service spatial et les services de Terre », par J. K. S. JOWETT.

Space Radio Research Committee

BIBLIOGRAPHY

The attention of the Members of this Committee is drawn to an article published in *Telecommunication Journal*, Vol. 31, No. 9, Sept. 1964, 249-255 : « Power limits and co-ordination procedures applying to frequency bands shared by space and terrestrial services », by J. K. S. JOWETT.

SPACE COMMUNICATIONS

We are informing our readers that the Hayden Publishing Company Inc., 850 Third Avenue, New York, 22, has issued a

book entitled «Space Communications», by Stanley LEINWELL, Radio Frequency and Propagation Manager, Radio Free Europe. 176 pages, 5 1/2" × 8 1/2", Price \$ 3.95.

The main items of the book are :

The present state of world communications.
Principles of space communications.
Passive space communications systems.
Active communications satellites.
Special purpose satellites.
The flight of Mariner II.
Joint space efforts — International cooperation.
The radio amateur in space.
Oscar I, II and III.
Project Oscar White Paper.
Space listening : a new hobby.
Direct broadcasting from earth satellites.
A look at the future.

Appendices :

Recent developments.
Communications satellite act, 1962
and a short bibliography.

INTER-UNION COMMISSIONS

Inter-Union Commission on Radiometeorology

WORLD CONFERENCE ON RADIOMETEOROLOGY

Boulder, Colorado, September 14-18, 1964

The Proceedings of the 1964 World Conference on Radiometeorology incorporating the Eleventh Weather Radar Conference, have been issued.

The Conference was sponsored by the following organizations :

- Inter-Union Commission on Radiometeorology,
- American Meteorological Society,
- Central Radio Propagation Laboratory, National Bureau of Standards,
- United States Weather Bureau.

The following papers are published in the Proceedings :

Anomalous echoes and angels

Angels in Focus, David ATLAS.

On sea breeze « Angels », Spiros G. GEOTIS.

Radar and refractometer investigation of clear-air stratification, D. R. HAY.

Detection, recognition and identification of birds on radar, E. W. HOUGHTON.

Occurrence and characteristics of radar angels observed with a vertically-pointing pulse radar, Hans OTTERSTEN.

A theory of offshore radar angels, D. B. RAI.

Hydrodynamic vortex seen by radar, W. SCHNAPAUFF.

Three dimensional analysis of a precipitation-free, sea-breeze front by radar, Tiros, visual and mesosynoptic data, H. V. SENN and H. P. GERRISH.

On the inference of atmospheric refractive index profiles from observations of radar angels, Paul L. SMITH, Jr.

Radio Climatology

- Dynamics of radioclimate up to 10 000 feet over a pacific ocean area,
L. T. BANKSTON.
- Climatology of elevated superrefractive layers arising from atmospheric
subsidence, B. A. CAHOON and L. P. RIGGS.
- A model of atmospheric refractivity and theoretical heights of radio-radar
rays for Miami, Florida-Harold P. GERRISH.
- A summary of tropospheric radio duct meteorology at VHF and UHF
as observed on a trip around the world, Feb. 8 to March 15, 1962,
Dwight L. RANDALL.

Meteorological effects on propagation

- Preliminary troposcatter phase and amplitude measurements in a radio-
meteorological experiment, W. P. BIRKEMEIER and D. H. SARGEANT.
- Atmospheric refractive effects on radar ground patterns, L. Glen COBB and
Vance E. MOYER.
- The influence of inversions on UHF-propagation over land, Gerda FENGLER.
- Dependence of 500 Mc/s field strength values and fading frequencies on
meteorological parameters, Gerda FENGLER.
- Wavefront distortion due to atmospheric inhomogeneities, A. D. MAIO,
J. P. CASTELLI and P. J. HARNEY.
- Some aspects of micropressure measurements for the evaluation of internal
waves in the atmosphere, Gere STILKE.

Sferics

- Field change due to lightning discharge, Haruji ISHIKAWA and Toshio
TAKEUCHI.
- On the «hook»-field components superposed on the C-field change of a
lightning discharge, S. R. KHASTGIR.
- Lateral corona currents from the return-stroke channel and the C-field
change in a lightning discharge, Manoranjan RAO and H. BHATTACHARYA.
- On the ELF atmospheric waveforms, Kazuo SAO, Michiko YAMASHITA and
Hidehiko JINDO.
- Non-lightning related radio noise from clouds as a source of cloud physics
information, J. Doyne SARTOR.
- Radiation from lightning discharge ELF through VHF, M. TAKAGI, H.
ISHIKAWA and K. SAO.

Rainfall measurements and drop-size distribution

- Areal rainfall amounts obtained by a 3.2 cm radar and rain gauge network,
Jiro AOYAGI.

- Radar measurements of precipitation rate, Pauline M. AUSTIN.
- Study of caboolture storm, comparison of radar and rain gauge observations, P. A. BARCLAY.
- A survey of five radar remote measurement techniques to measure the particle drop size distribution of water clouds and rains, Jack E. BRIDGES.
- A study of raindrop size distribution in the free atmosphere, P. G. F. CATON.
- Radar precipitation measurements, Ronald T. H. COLLIS.
- Hail size distributions, R. H. DOUGLAS.
- A fitting equation for raindrop-size distribution in various weather situations, Ichiro IMAI.
- Results of precipitation measurements with Weather Bureau radars, Allen F. FLANDERS.
- Z-r equation in various storms, Miyuki FUJIWARA
- An extension of the z-r relation for Doppler radar, R. R. ROGERS.
- Case studies of the areal variations in raindrop size distributions, Arthur L. SIMS.

Scattering and Attenuation

- Observations of attenuation of 3 cm radiation by precipitation, Pauline M. AUSTIN.
- Complete scattering parameters of polydispersed hydrometeors in the 0.1 to 10 cm range, D. DEIRMENDJIAN.
- Measurement of forward-scatter cross sections in the melting layer, F. G. FERNALD and A. S. DENNIS.
- The effects of multiple scattering on radar back-scattering, Benjamin M. HERMAN.
- Observations of the ellipticity of raindrops using a polarized radar system, M. C. HODSON and T. V. PETER.
- Scattering of microwaves by adjacent water droplets in air, Olav LILLESÆTER.
- A study of the radar precipitation attenuation as deduced from drop size distribution, E. A. MUELLER.
- The atmosphere at 3.2 mm, Fred SHIMABUKURO.
- Scattering of microwaves by cloud droplets, Paul L. SMITH, Jr.

Tropospheric and terrain noise radiation

- Millimeter-wave atmospheric emission measurements and their relation to meteorological conditions, A. C. ANWAY.
- Brightness temperature of the atmosphere using a bi-exponential model in the 6-45 GHz frequency range, E. J. DUTTON, B. R. BEAN and E. R. WESTWATER.

Atmospheric absorption and radiation temperature in the microwave spectrum, Roger M. LHERMITTE and Wayne M. MOUNT.

Latitudinal, diurnal and seasonal variations of atmospheric emission theoretically determined for measurement points outside the atmosphere, G. D. PHILIPS and W. H. BELLVILLE.

Near-earth millimeter wave radiometer measurements, Kenneth A. RICHER and Donald G. BAUERLE.

Radio refractive index measurements

Investigation of the space and time structure of the turbulent refractivity by a correlation analysis of the electromagnetic scatter-field, FEHLHABER L., GROSSKOPF, J.

Preliminary study of spatial distribution of atmospheric refractive index from aircraft observations, Madoka FUKUSHIMA and Hiromi IRIYE.

The response of microwave refractometer cavities to atmospheric variations, R. O. GILMER, R. E. MCGAVIN and B. R. BEAN.

Some measurements of the structure of elevated layers in the troposphere, J. A. LANE.

Graphs of the partial derivatives of the refractive index equation and some of their applications, V. G. PLANK and A. A. SPATOLA.

On methods and results of our refractive index measurements, carried out with kytoonborne radiosondes and airborne refractometers, Gerd STILKE.

An investigation of the semi-fine structure of the refractive index field in a coastal area, Sture WICKERTS.

Techniques and instrumentation

Radar reflections from acoustic shock waves, a preliminary study, Clayton H. ALLEN.

Wind measurement by conventional radar with a dual beam pattern, David ATLAS and Raymond WEXLER.

Weran : a weather radar data processor and analyser, Ernest BALLANTYNE.

An engineering evaluation of stradap, J. BRADLEY, A. FARNESE, P. HEXTER and B. LUKASCHEWSKY.

A high contrast radar indicator and camera, Robert H. BUSHNELL.

Improvement in accuracy of thunderstorm echo top measurement, Ralph J. DONALSON, JR.

An economic method of recording and transmitting weather radar information, W. A. GRINSTED and A. P. TUTHILL.

Theoretical considerations for range and height correction of precipitation echoes on RHI radar, H. W. HISER.

A pulsed-Doppler radar for weather observations, Nobuhiko KODAIRA.

- An experimental pulse Doppler radar for severe storm investigations, Roger M. LHERMITTE.
- Increased meteorological target detection by X-band radar set AN/MPS-34 using Maser preamplifier, Raymond L. ROBBIANI.
- Application of advanced techniques in operational radar meteorology, Donald K. SPEED.
- Line integral refractometer, John F. SULLIVAN and Harold M. RICHARDSON.
- Development of a radar support facility at the National Center for Atmospheric Research, Jack D. TEFFT.
- The CAL Pulse Doppler radar, B. Riley TRIPP.
- Operational Cappi and facsimile : twelve months of appraisal and development, Marcell WEIN and K. L. S. GUNN.

Hurricanes

- The structure of hurricane spiral bands, Kenneth R. HARDY, David ATLAS and Keith A. BROWNING.
- Comparison of hurricane center fixes from land-based radar and from reconnaissance aircraft during hurricane Ginny, Charles R. HOLLIDAY.
- Cappi analysis of typhoon Thelma, K. OTANI.
- Evolution of hurricane Ginny as seen on wsr-57 radar at Charleston, S. C., Alexander SADOWSKI
- Comparison of 18 simultaneous eye positions hurricane Ginny by three coastal radars, Howard ULSH and Gerarld S. FRENCH.

Storm structure

- Some Doppler radar observations of a decaying thunderstorm, L. J. BATTAN, J. B. THEISS and A. R. KASSANDER, JR.
- Interaction of two severe local storms, Keith A. BROWNING.
- Radio-meteorological thunderstorms in the tropics, M. W. CHIPLONKAR, R. N. KAREKAR and P. R. MARWADI.
- Precipitation profiles in shower situations, P. M. HAMILTON.
- The frequency of occurrence of precipitation echoes in the Transvaal, M. C. HODSON.
- Radar observations of tropical summer convective cells, H. MITRA, S. M. KULSHRESTA and P. S. JAIN.
- Radar study of the premonsoon thundersquall over the Gangetic valley of West Bengal and Brahmaputra Valley of Assam, D. K. RAKSHIT and A. C. DE.
- Premonsoon squall lines in northeast India and east Pakistan — radar cum synoptic study, D. V. SUBRAMANIAN and A. K. BANERJI.
- Structure and mechanism of a Hugh radar rainband, Ryozo TATEHIRA.
- The Newton, Kansas tornado cyclone of May 24, 1962, Neil B. WARD.

Tropospheric propagation, super refraction, scatter propagation

- Radio wave propagation in a horizontally as well as vertically inhomogeneous atmosphere, Lennart ADAMSSON.
- A statistical normal mode theory of transhorizon scatter propagation, W. S. AMENT.
- Conditions of super-refraction around Dum Dum airport, Calcutta, A. C. DE.
- The equivalent height for reflection of radio waves from tropospheric layers, Claus FENGLER.
- Determination of the angle of incidence for reflection at concentric layers, Claus FENGLER.
- Reflection against inclined layers, Claus FENGLER.
- Isotropy properties of the tropospheric refractive index and air velocity fields as determined by radio methods, Dag T. GJESSING.
- Frequency dependence of seasonal variation of transmission loss in tropospheric beyond-the-horizon propagation at VHF and UHF, Masaichi HIRAI and Yoshitaka KURIHARA.
- Transhorizon-transmission and height gain measurements above the sea with waves in the range of 1.8 cm to 187 cm under special consideration of meteorological influences, Helmut JESKE.
- The origin of the envelope spectrum of a signal scattered from a turbulent medium, Richard B. KIEBURTZ.
- Separation of elevated-layer reflection wave and scatter wave in UHF beyond-the-horizon propagation, Tetsuo KOONO and Masaichi HIRAI.
- 3 cm propagation in the rear of a thunderstorm, S. RAGHAVAN.
- Anomalous propagation of microwaves associated with thunderstorms, D. K. RAKSHIT, P. BHATTACHARYA and A. C. DE.

Measurements at optical wavelengths — Lasers

- Meteorological observations with Lidar, Myron G. H. LYGDA, ScD.
- A study of parallel-beam attenuation in the atmosphere at optical wavelengths, Olav LILLESÆTER.
- The use of coherent light in gathering significant meteorological data, Richard H. McFARLAND.

Late Manuscripts

- Mise en évidence expérimentale d'une structure feuilletée de la stratosphère, par A. VILLEVIEILLE.
- Some refractometer measurements of the anisotropic turbulent blob structure of refractive index, G. BULL.

Inter-Union Commission on Solar and Terrestrial Relationships (I.U.C.S.T.R.)

INFORMATION

In accord with the agreed Constitution of the Inter-Union Commission, the I.A.U. hereby informs I.U.G.G. and U.R.S.I. as follows :

1. *Composition.* The present membership consists of :

<i>Union</i>	<i>Name and country</i>	<i>Appointed</i>
I.A.U. :	C. W. ALLEN (U. K.), <i>President</i>	1961
	R. GIOVANELLI (Australia)	1961
	E. R. MUSTEL (U. S. S. R.)	1961
	M. WALDMEIER (Switzerland)	1964
I.U.G.G. :	(Mrs.) N. P. BENKOVA (U. S. S. R.)	1963/4
	T. OBAYASHI (Japan)	1963/4
	W. O. ROBERTS (U. S. A.)	1963/4
	E. J. VASSY (France)	1963/4
U.R.S.I. :	G. M. ALLCOCK (New Zealand)	1961
	D. K. BAILEY (U. S. A.), <i>Secretary</i>	1961
	R. COUTREZ (Belgium)	1961
	A. H. SHAPLEY (U. S. A.)	1961

The Inter-Union Commission formally came into existence on 14 August 1961, when it held its first meeting, but its original members were appointed earlier. According to the Constitution « at least one of the four members appointed by each Union is to be replaced, at intervals of not more than three years, by a new member who has not served as a member of the Commission during the previous six years ». I.U.G.G. replaced all its four members in October 1963, and I.A.U. then proposed that both U.R.S.I. and I.A.U. should replace at least one of its four members with effect from 1 January 1964. (This date was chosen for general convenience, and to ensure that changes of membership occur at times when meetings are unlikely.)

U.R.S.I. has made no proposals for any replacement. I.A.U. wait for U.R.S.I. s proposals so that it could make its appointment to accord with adequate scientific and regional representation ;

at its meeting on 1 September 1964, the I.A.U. Executive Committee decided to appoint M. Waldmeier (in replacement of J. F. DENISSE).

2. *Meetings.* — The I.U.C.S.T.R. held a business meeting on the morning of Monday 24 August 1964, in Hamburg, immediately prior to the twelfth General Assembly of the I.A.U. This was followed, in the afternoon, by an « Open Discussion on Solar-Terrestrial Relations ».

3. *Publications.* — The *Review Reports* have been published as a supplement to « Planetary and Space Science », and many copies have been distributed free to those interested. Copies may be purchased from Pergamon Press Ltd.

It is proposed that (as in 1961) the proceedings of the recent meetings of the I.U.C.S.T.R. in Hamburg should be published in *Transactions of the I.A.U.*, Volume XIIB. Subject to the agreement of the General Secretary of the I.A.U., reprints will be made available, as for the first meeting in 1961.

4. *Finance.* — The I.A.U. has a separate account for the I.U.C.S.T.R., of which the following is the current state.

Income :

Grant from I.C.S.U. of \$ 3000 (promised but not yet actually received) = £ 1071. 8. 8

Expenditure :

Miscellaneous postage etc. charges to date	14.13. 3
Charges for reprints (per C. W. ALLEN)	11. 6. 0
Miscellaneous expenses in connection with the September 1964 meeting in Hamburg	13.10. 0
Travel and subsistence expenses for the Chairman, C. W. ALLEN, to Hamburg	52. 1. 8
Travel grant to R. GIOVANELLI to Hamburg (D.M. 200)	17.17. 2
To Pergamon Press, for contribution towards cost of production of the Review Reports	389. 0. 0
To Pergamon Press, for packing and postal charges	37.10. 0
	<hr/>
Total	£ 535.18. 1
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<i>Balance</i> to be carried forward	£ 535.10. 7

5. — The concurrence of I.U.G.G. and U.R.S.I. is sought to the proposals above.

(Please address your reply to the General Secretary, Dr. J.-C. Pecker, Observatoire de Nice, Le Mont Gros, Nice, France, to whom all similar reports and proposals concerning the Inter-Union Commissions of which I.A.U. is a member should also be sent.)

D. H. SADLER
former General Secretary, I.A.U.,
16 September 1964.

TENTH REPORT ON SOLAR — TERRESTRIAL RELATIONS

The Inter-Union Commission on Solar and Terrestrial Relationships (I.U.C.S.T.R.) has edited its Tenth Report on Solar - Terrestrial Relations.

This report published in «*Planetary and Space Science*», Volume 12, May 1964, Pergamon Press, contains the following items.

- Introduction.
 - The influence of the sunspot cycle on phenomena at the bottom of the atmosphere, C. W. ALLEN (Reporter).
 - Manifestations de l'activité solaire dans le passé historique, F. LINK.
 - The indices of solar activity, G. GODOLI and C. W. ALLEN.
 - Influence of solar activity on the Earth's upper atmosphere, L. G. JACCHIA.
 - The solar extreme ultraviolet radiation (1-400 Å), J. C. LINDSAY.
 - Problems of differentiation of flares with respect to geophysical effects, H. W. DODSON and E. R. HEDEMAN.
 - The listing of sudden ionospheric disturbances, J. V. LINCOLN.
 - Radio evidence for solar corpuscular emission, A. MAXWELL, R. J. DEFAUW and P. CUMMINGS.
 - Coronal expansion and solar corpuscular radiation, E. N. PARKER.
 - Streaming of solar particles between Sun and Earth, T. OBAYASHI.
 - M — Region, C. W. ALLEN.
 - Polar-cap absorption, D. K. BAILEY.
-

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

List of Documents distributed to members of the Inter-Union Committee

- Doc. I.U.C.A.F./21-39 : See list given in Doc. I.U.C.A.F./40.
- Doc. I.U.C.A.F./41 : « Factors Affecting the Possibility of Frequency Sharing by Radar Astronomy » (Draft Report from U. S. A., October, 1962).
- Doc. I.U.C.A.F./42 : Memorandum to U.N.E.S.C.O. on work of I.U.C.A.F. (November, 1962).
- Doc. I.U.C.A.F./43 : Letter dated 29th November, 1962 (with two appendices) from Secretary-General I.U.C.A.F. to all National Members of the I.T.U.
- Doc. I.U.C.A.F./44 : Report of meeting of I.U.C.A.F. held in Geneva on 28th and 29th November, 1962.
- Doc. I.U.C.A.F./45, including 45*a* and 45*b* : Distribution of nine I.T.U. Circulars relating to the Radioastronomy Service (March and August, 1963).
- Doc. I.U.C.A.F./46 : Report on the Xth Plenary Assembly of the International Radio Consultative Committee (C.C.I.R.) held at Geneva, January-February, 1963.
- Doc. I.U.C.A.F./47 : Notification of inclusion of Radio Astronomy in Agenda of Extraordinary Administrative Radio Conference of I.T.U., Geneva-October, 1963.
- Doc. I.U.C.A.F./48 : Letter from John W. Findlay, U. S. National Research Council concerning the WEST FORD experiment (May, 1963).
- Doc. I.U.C.A.F./49 : Report on the Need for the Protection of Certain Bands of Radio Frequencies for Radio Astronomy and Space Science (June, 1963).
- Supplement to above : Letter dated 9th July, 1963 concerning Draft Recommendations on Frequencies for the Radio Astronomy and Space Research Services.
- Doc. I.U.C.A.F./50 : Report of fourth meeting of the Committee held in Paris on 28th and 29 th May, 1963.

- Doc. I.U.C.A.F./51 : Letter dated 3rd August, 1963 from R. L. Smith-Rose.
- Doc. I.U.C.A.F./52 : Distribution of Scientific American for June, 1963.
- Doc. I.U.C.A.F./53 : « The Present Usage of the Frequencies assigned to Radio Astronomy in Radio Regulations, Geneva, 1959, up to and including the Band 4990-5000 Mc/s », by F. Graham Smith.
- Doc. I.U.C.A.F./54 : Report on the Extraordinary Administrative Radio Conference, Geneva, 1963, and the allocation of frequencies for Radio Astronomy and Space Science.
- Doc. I.U.C.A.F./55 and 55a : Letters dated 10th February and 6th March, 1964 from R. L. Smith-Rose.
- Doc. I.U.C.A.F./56 : Letter from John W. Findlay dated March 24th, 1964; and associated papers relating to PROJECT WEST FORD.
- Doc. I.U.C.A.F./57 : « Allocation of Frequencies for Radio Astronomy and Space Science ». A paper by R. L. Smith-Rose read at the C.O.S.P.A.R. Plenary Meeting, Florence, May, 1964.
- Doc. I.U.C.A.F./58 : Proposal from the U. S. National Academy of Science, for Revision of Table I and addition of a paragraph to C.C.I.R. Report No. 224 on Radio Astronomy.
- Doc. I.U.C.A.F./59 : « Frequency Allocations for Radio Astronomy, August, 1964 », by F. Graham Smith.
- Doc. I.U.C.A.F./60 : List of documents distributed to members of the Commission.
- Doc. I.U.C.A.F./61 : « Allocation of Frequencies for Radio Astronomy and Space Science » — Revision of Doc. I.U.C.A.F./57 published in *Nature*, Vol. 203, pp. 7-11.
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ANNÉE GÉOPHYSIQUE INTERNATIONALE

Antarctique

L'Expédition Antarctique Belge 1957-1958 vient de publier les volumes de résultats scientifiques énumérés ci-après :

Vol. II. — Météorologie.

Fas. 1. — Instruments et méthodes d'observation, X. de MAERE D'AERTRYCKE.

Fas. 2. — Données tabulées, X. DE MAERE D'AERTRYCKE.

Vol. III. — Géomagnétisme.

Fas. 1. — Installation des instruments et méthodes d'observation, L. CABES.

Vol. IV. — Aurores, J. LOODTS, G. de GERLACHE de GOMERY et P. DOYEN.

Vol. V. — Ionosphère.

Fas. 1. — Instruments et données tabulées, H. VANDEVELDE.

Annals of the I.G.Y.

Volume XXXVI of the *Annals of the I.G.Y.* has been issued, it contains the *Catalogue of Data in the World Data Centers* for the period of the I.G.Y. and International Geophysical Cooperation, 1959 (1 July, 1957-31 december, 1959).

According to the international agreements concerning the World Data Centers, each of the WDC-s (WDC-A, WDC-B, and WDC-C) has a complete set of the I.G.Y./I.G.C. data. Furthermore, WDC-A was assigned the task of preparing the final catalogue for some disciplines and of performing the task of checking catalogues for *all* disciplines prior to publication in the Annals. Because

this volume of the *Annals* reflects fully the data collection in World Data Center A, WDC-A is not issuing its own separate catalogue of I.G.Y./I.G.C. data.

This catalogue presents the most complete list which could be assembled of the stations which actually participated in the I.G.Y. programme, the programmes carried out, and the data which were exchanged in accordance with international agreements.

I. Q. S. Y.

Rapport pour l'U.N.E.S.C.O.

Sous le titre « Les Années Internationales du Soleil Calme (A.I.S.C.) », le Comité pour les Années Internationales du Soleil Calme a publié une brochure contenant le Rapport établi pour l'U.N.E.S.C.O. en mars 1964.

Special Committee for the I.Q.S.Y.

Resolutions

1. — IONOSPHERE KEY STATIONS

The Special Committee for the I.Q.S.Y. :

notes that only one vertical incidence sounding station has been designated as a key station in middle latitudes in the Southern Hemisphere, and that it would be desirable to have three to six such stations well distributed in longitude,

calls the attention of I.Q.S.Y. participating committees to these gaps in the distribution of key stations and,

invites the nomination of additional key stations at middle latitudes in the Southern Hemisphere.

2. — FLOW OF F-PLOTS

The Special Committee for the I.Q.S.Y. :

notes that the flow of *f*-plots to the WDCs is referred to in the Guide to Data Exchange (*I.Q.S.Y. Manual, No. 6*) and that *f*-plots are used for the compilation of world ionospheric indices which are required as quickly as possible,

urges that the *f*-plots from key stations should flow to WDCs at a faster rate than that specified in the Guide.

3. — CUSTOMS CHARGES

The Special Committee for the I.Q.S.Y. :

notes that customs authorities frequently charge import duty based on the full value of scientific equipment, even when it has been imported temporarily in connection with international scientific projects such as the I.Q.S.Y.,

regrets that this action often prevents the implementation of important scientific programmes and thus hinders scientific progress,

strongly urges U.N.E.S.C.O. and other competent organizations to take all possible steps to ensure that the duty charged on temporarily imported scientific equipment shall be reduced to a minimum or cancelled.

4. — ABSOLUTE CALIBRATIONS

The Special Committee for the I.Q.S.Y. :

notes (a) that the I.Q.S.Y. provides the first opportunity for making extensive measurements of the intensity of solar radio noise and of uv- and x-radiation at the minimum phase of a solar cycle,

(b) that the stability of the instruments used and hence the relative accuracy of the resulting measurements is often high, but that the absolute accuracy of such measurements is not always as high as could be desired,

invites I.A.U., U.R.S.I., C.O.S.P.A.R. and other competent organizations to emphasize the importance of making absolute calibrations and of organizing the inter-comparison of instruments as soon as possible and certainly before the end of the I.Q.S.Y.

5. — P.O.C.I.B.O.

The Special Committee for the I.Q.S.Y. :

notes the recent exchange of correspondence between the U. S. and U. S. S. R. Committees for I.Q.S.Y. which removes apparent obstacles to full scientific cooperation in the P.O.C.I.B.O. project,

considers that the programme will make great scientific contributions to the I.Q.S.Y. programme and that the project provides an opportunity for direct international participation in the experiments and in the use of the data in keeping with the spirit of international cooperation which pervades the I.Q.S.Y. programme, *strongly supports* the scientific objectives of the P.O.C.I.B.O. project,

recommends that plans for the complete implementation of the project should now proceed with the cooperation of all interested scientific groups and particularly of those in countries bordering the Arctic basin.

6. — GUIDE TO DATA INTERCHANGE

The Special Committee for the I.Q.S.Y. :

calls the attention of participating committees to the existence of the C.I.G. Guide to International Data Exchange and to I.Q.S.Y. *Instruction Manual*, No. 6 (which contains the sections of the Guide that refer to I.Q.S.Y. disciplines),

requests these committees to inform their colleagues of the contents of the Guide,

urges that data shall be transmitted punctually to the WDCs in accordance with the recommendations contained in the Guide.

7. — FLOW OF DATA

The Special Committee for the I.Q.S.Y. :

considers that the geophysical data for the period 1960-63 will be valuable in studies ranging over the period from sunspot maximum to sunspot minimum, including the I.Q.S.Y.,

urges that all those concerned in the supply of data to the World Data Centres should complete the flow of data for the period 1960-63 as soon as possible, and preferably not later than the end of 1964.

Review of I.Q.S.Y. Notes, No. 8, August 1964

I.Q.S.Y. Notes, No. 8 contains the following main items :

Foreword.

A Bibliography for the I.Q.S.Y.

World Days Programme.

International Geophysical Calendar 1964-1965.

National Warning Contacts.

Abbreviated Calendar Record March/April 1964.

Regional I.Q.S.Y. Symposium, Buenos-Aires, August 1964.

U.R.S.I.-C.I.G. Resolutions, Tokyo September 1963.

I.A.G.A. Working Group on Morphology of Rapid Magnetic Variations
Circular Letter.

Amendment to *I.Q.S.Y., Notes, No. 7*.

Visual Observations of Aurora by Officers in Civil Aircraft.

Form for Reporting Observations of Aurora from Aircraft.

Transequatorial Radio Propagation on 29-50 Mc/s.

Cosmic Radiation; International Data Exchange.

Geographic Distribution of I.Q.S.Y. Stations.

I.Q.S.Y. Programmes of Participating Countries.

Annals of the I.Q.S.Y.

In the foreword readers are informed that one of the main decisions reached by the I.Q.S.Y. Bureau and the I.Q.S.Y. Committee at the meetings held in Arcetri, Italy, May, 1964, was to arrange for the publication of a series of volumes to be entitled « *Annals of the I.Q.S.Y.* ». The aim of this series will be similar to that of the well known « *Annals of the I.G.Y.* », which is now nearing completion. Fuller information about the contents of the new series will be contained in *I.Q.S.Y. Notes*, No. 9.

A BIBLIOGRAPHY FOR THE I.Q.S.Y.

To facilitate reference to results obtained during the I.Q.S.Y., the I.Q.S.Y. Committee has recommended that preparations should now be made for the eventual publication of a bibliography containing references to papers describing the results of the investigations carried out during this new enterprise. Papers on I.S.Q.Y., which are necessarily of a general nature, have already been publi-

shed in some countries, and the Committee is taking steps to encourage the preparation and publication of similar accounts in all participating countries in order to make the concepts and aims of the I.Q.S.Y. as widely known as possible.

The list of papers which follows is, without doubt, very incomplete and the Secretary of the I.Q.S.Y. Committee would be grateful to receive full information about other papers relating to the I.Q.S.Y.

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WORLD DAYS PROGRAMME

The World Days Programme gives :

- (i) I.Q.S.Y. Geolert messages issued during April, May and up
to June 17th.
- (ii) The International Geophysical Calendar for the International
Years of Quiet Sun, 1964 and 1965.
- (iii) The National Warning Contacts.

ABBREVIATED CALENDAR RECORD

March-April 1964

The Abbreviated Calendar Record, which appears in this issue, is a summary chronological account of solar and geophysical activity and events. It is an abbreviated record, prepared mainly from provisional data reports, and is similar to the Calendar Record compiled for the I.G.Y. and I.G.C.-1959 (*Annals of the I.G.Y.*, Vol. XVI), and those in preparation by I.U.W.D.S. for subsequent years. It is intended to give a background for the early interpretation of solar-geophysical results of I.Q.S.Y. programs. Since it is compiled from provisional data, it should not be relied on for details of solar and geophysical events in preference to the standard publications such as those listed in *I.Q.S.Y. Instruction Manual*, No. 1, World Days, pp. 34-36. The compilation has been done by the Deputy Secretary of the I.U.W.D.S. (Miss J. V. Lincoln, C.R.P.L., Boulder, U. S. A.) largely from data taken from the telegraphic interchange coordinated by I.U.W.D.S., and from comments provided by the I.Q.S.Y. World Warning Agency.

The Calendar Record gives the following data : date, 10 cm flux, sunspot numbers, geomagnetic index, A_p , central meridian passage (C.M.P.) of solar active regions, and solar and geophysical headlights.

I.Q.S.Y. PROGRAMMES OF PARTICIPATING COUNTRIES

Some of the programmes published are new ; other are revisions of programmes that were published previously. Hereunder some abstracts connected directly to U.R.S.I. activities.

Argentine Republic

Revised programme

IONOSPHERE.

1. *Vertical Incidence.*

It is planned to continue and increase the observations made during the I.G.Y. and afterwards, and also the systematic analysis and application of the information obtained, keeping in mind the policy recommended by several international organizations and assemblies. Vertical incidence soundings will be performed at :

1.1. Buenos Aires : Medium sensitivity soundings at 00, 15, 30, and 45 minutes after the hour ; a low sensitivity sounding at 59 minutes and a high sensitivity at 01 minutes. On Regular World Days and during Special World Intervals further medium sensitivity soundings will be performed at 05, 10, 20, 25, 35, 40, 50 and 55 minutes past the hour.

1.2. Trelew, Ushuaia, Decepción : Hourly soundings on normal days and every 15 minutes on Regular World Days and during Special World Intervals.

1.3. Oceanographic ship A.R.A. « Capitan Canepa » : Special soundings at sea.

1.4. Station of the Universidad Nacional de Tucumán : Medium sensitivity soundings at 00, 15, 30 and 45 minutes ; a low sensitivity sounding at 59 minutes and a high sensitivity one at 01 mi-

minutes. On Regular World Days and during Special World Intervals further medium sensitivity soundings will be performed at 05, 10, 20, 25, 35, 40, 50 and 55 minutes.

1.5. General Belgrano Base : Medium sensitivity soundings at 00, 15, 30 and 45 ; a low sensitivity sounding at 59 minutes and a high sensitivity one at 01 minutes. On regular World Days and during Special World Intervals further medium sensitivity soundings will be performed at 05, 10, 20, 25, 40, 50 and 55 minutes. These soundings have been interrupted temporarily by a fire at the power plant of the station. They will be resumed as soon as the damage is repaired.

Personnel : Ingeñero Victor Padula Pintos. Ingeñero Roque López de Zavalía.

2. *Whistlers and VLF Emissions.*

It is planned to continue and improve the observations under way in cooperation with foreign institutions, in an attempt to comply with the recommendations outlined by several international organizations and assemblies.

Recordings will be obtained at Ushuaia and Tucumán.

Personnel : Ing. V. H. Padula Pintos. Licenciado Sandro Radicella.

3. *Soundings by Means of Rockets.*

It is planned to launch rockets in order to measure in the first place electron density and temperature. These observations will be made within the equatorial electro-jet region with the cooperation of N.A.S.A., in compliance with the recommendations outlined by several international organizations and assemblies.

Two Nike Cajun rockets will be launched from the Chemical Rocket Launching Facility in October 1964. Further experiments are planned for the W.G.I. in 1965.

Personnel : Lic. Sandro Radicella.

4. *Reception of Beacon Satellite Signals.*

It is planned to integrate the chain established in compliance with the programs and recommendations outlined by several international organizations and assemblies.

Observations will be made from Ushuaia and Tucumán.

Personnel : Ing. V. H. Padula Pintos. Lic. Sandro Radicella and Ing. R. López de Zavalía.

5. *Measurement of Absorption.*

Measurements of absorption will be performed by the pulse method (A1) in Buenos Aires from June 1965 on. Measurements of absorption using the cosmic noise method (A2) will be performed at Ushuaia and General Belgrano Base — at Ushuaia from January 1st, 1965 and at General Belgrano Base as soon as the fire damage has been repaired.

Personnel : Ing. V. H. Padula Pintos.

6. *Measurement of Drift.*

Measurements will be performed by comparison of relative fading on three receiver antennae at La Plata from January 1st, 1965 on.

Personnel : Ingeniero Méndez and Ingeniero De. Sicilia.

7. *Measurement of Atmospheric Noise.*

From June 1965 on, measurements will be performed at Ushuaia and at La Plata.

Personnel : Ing. Marabini, Ing. V. H. Padula Pintos.

SOLAR ACTIVITY.

3. *Solar Patrols in Radio Frequencies.*

Construction is under way of :

1. a parabolic radiotelescope for observation of the sun at 2700 Mc/s.
2. a solar interferometer on a 900 m. baseline (Yagi array) to operate at 89 Mc/s. Both instruments will be in operation by mid-1964.

SPACE RESEARCH.

The present programme is outlined in view of the fact that the work plans of the various disciplines during the I.Q.S.Y. will occasio-

nally require the use of sounding rockets for the performance of certain scientific experiments. It will be the Space Research Work Group's responsibility to obtain those elements and coordinate their use.

3. *Ionosphere.*

At the end of 1964, within a program of cooperation with N.A.S.A., two Nike-Cajun rockets will be launched from Champaign (density and temperature of electrons). For 1965, three similar launchings are planned.

WORLD DAYS.

Programme.

1. Reception of information. Data to be issued as warnings by Regional or World Centers with which contacts are already being established.

2. Data available in advance. I.Q.S.Y. Calendar and other information to be issued by Regional or World Centers.

3. Information to be distributed. That mentioned under 1. and 2. to groups and institutions requesting it.

4. Distribution of information. It is planned to use, according to the type of data, one or more of the following means of communication, with previous advice to interested parties. Through standard frequency broadcasting station LOL at 5, 10 and 15 MHz; through Radio Nacional and its network; through commercial networks; through radiograms or direct telephone or radiotelephone calls to interested parties in special cases; eventually, through the Navy Ministry's network.

Personnel : Capitán de Corbeta Oscar Hourcade.

Canada

Additional information

IONOSPHERE.

Installation of the high-power fixed-frequency ionosonde at Resolute Bay is complete. Operation of the oblique sounders on the trans-Atlantic and auroral circuits has been discontinued.

Ceylon

November 1963

IONOSPHERE.

Absorption (A1).

(a) At Colombo (6°54'N, 79°52'E), the noon absorption will be measured daily at two frequencies chosen from 2.3 Mc/s, 2.55 Mc/s and 2.85 Mc/s.

(b) Night observations will be made at least once per week on same frequencies.

(c) Diurnal variation of absorption will be determined on R.W.D. and, if possible, during MAGSTORM and COSMIC EVENT Alerts.

Cuba

Revised programme

IONOSPHERE.

Vertical sounding in the frequency range 1.0 to 20 Mc/s every 15 minutes with equipment of Soviet construction.

Note. — It is hoped that the geomagnetic and earth current measurements and also the observation of artificial satellites will commence in May 1964, and the ionospheric measurements one or two months later.

The station for these observations will be installed 30 kilometers south east of Havana at lat. 22°58'N, long. 82°26'W.

East-Africa

Revised programme

IONOSPHERE.

At Nairobi :

(a) Regular vertical incidence soundings at one-hourly intervals on normal days and 1/4 hourly intervals on World days and days of special interest. (We are limited to hourly records on account of the cost.)

(b) Fading intercomparison at close spaced receivers for measurements of horizontal drifts D1.

(c) Faraday rotation of signals from artificial satellites.

The atmospheric radio noise experiments have not yet commenced because of the shortage of operators but we hope that we may be able to add this in the near future; furthermore, we may carry out some studies on meteor incidence using the radar system operating on about 20 Mc/s.

German Democratic Republic

IONOSPHERE.

3d. « 27 Mc/s Polar star » must be corrected to « 25 Mc/s Polar star ».

3e. « 30 Mc/s Polar star » must be corrected to « 28 Mc/s Polar star ».

6e. The 27 Kc/s Atmoradiograph programme has been cancelled.

13c. « Narrow-sector-recorder Potsdam, K hlungsborn », please add « K hlungsborn, planned for 1965 ».

Hungary

IONOSPHERE.

Synoptic observations :

- 1.1. Vertical incidence soundings at B k scaba, from January 1, 1964.
- 1.2. E.L.F. noise observations at Nagycenk from July 1, 1964.
- 1.3. Wave form of atmospherics at Budapest observatory from July 1, 1964.

India

Summary of the present position regarding the Indian National Programme for I.Q.S.Y., as on 1st April 1964

WORLD DAYS.

An Associate Regional Warning Centre has been established in Delhi with headquarters at the N.P.L. under Dr. A. P. Mitra.

The Centre works in collaboration with the India Meteorological Department and the All India Radio. GEOALERTS are currently distributed in the following manner :

- (i) Through Northern Hemisphere Exchange Centre, New Delhi on the Northern Hemispherical R.T.T. communication system immediately after receipt.
- (ii) Through broadcast by A.I.R. once a day at the end of the daily evening programme and at frequencies which are periodically reviewed and revised.
- (iii) Through A.I.M.B.C. (MORSE), soon after receipt.
- (iv) Through interval T/P system of the India Meteorological Department (soon after receipt).

While a procedure for the distribution of ADALERTS has been worked out, regular issue of ADALERTS has not started.

METEOROLOGY.

2. Sferics recording — Sferics on 27 kc/s are continuously recorded at Delhi (N.P.L. and I. net D.), Nagpur and Srimiketan (I. net. D.), Varanasi (University) and on 27 kc/s and 10 kc/s at Poona (University).

IONOSPHERE.

1. Vertical self-recording *ionosondes* at New Delhi, Ahmedabad, Kodaikanal and Calcutta. A C4 recorder will shortly be installed at Trivandrum.

2. Manually operated *ionosondes* (A.I.R.) at Delhi, Bombay, Madras, Tiruchirapalli and Trivandrum. Also at Hyderabad (Defence Electronics).

3. *Ionospheric Drifts : D1.*

At Ahmedabad (P.R.L.), Delhi (A.I.R.), Trivandrum (P.R.L.) and Waltair (University).

D1 Drift measurements will also be made at Tiruchirapalli (A.I.R.), Scintillation of radio stars Ahmedabad (P.R.L.).

4. *Ionospheric Absorption.*

A1 — Delhi (A.I.R.) — Hyderabad. Equipment being prepared at Varanasi (University) for Trivandrum (P.R.L.).

A2 — Ahmedabad (P.R.L.), Delhi (N.P.L.), Trivandrum (P.R.L.).

5. *Satellite telemetry* stations for Faraday rotation electron density and solar ultra-violet and X-radiation have been established at Ahmedabad (P.R.L.), New Delhi (N.P.L.) and Hyderabad.

SOLAR ACTIVITY.

2. *Solar Radio Noise.*

Kodaikanal — 100 Mc/s.

Delhi (N.P.L.) — 2000 Mc/s with a 6ft. (1.8 m) dish. This will be replaced shortly by an 18 ft. (5.5 m) parabola.

3. *Solar Flare Patrol.*

3.1. Riometers are working at Delhi (N.P.L., A.I.R.), Ahmedabad (P.R.L.) and Trivandrum (N.P.L., P.R.L.).

3.2. Field strength recordings of Radio Tashkent on 164 kc/s are going on at Delhi (N.P.L., A.I.R.) and Ahmedabad (P.R.L.). A station at Gulmarg will be added shortly.

3.3. Sferics on 27 kc/s and 100 kc/s at Delhi (N.P.L.).

3.4. Field strength records of Radio Ceylon (6.1 Mc/s) are made at Kodaikanal.

Iraq

IONOSPHERE.

Work is proceeding on the installation of a vertical incidence ionospheric sounder with folded dipole aerials at Baghdad (33°20'55"N, 44°23'00' E). Recordings will be made on paper film every quarter hour.

It is hoped to start recording during the second half of 1964.

Jamaica

IONOSPHERE.

1. The ionospheric station at Kingston, Jamaica will be operated as a main station throughout the I.Q.S.Y. period.

Ionograms will be taken every 15 minutes on ordinary days and every 5 minutes on the R.W.D. and S.W.I.

Reductions will be made for hourly values of

$$f_{min}, f_oE, f_oE_s, f_oF_1, f_oF_2, \\ h'E, h'E_s, \text{ and } h'F.$$

F-plots will be plotted. It is hoped to reduce the records to obtain hourly true-height electron density data ($N(h)$ profiles) for two or three quiet days each month.

2. Measurements will be made of ionospheric drifts by observations of the pulsed signals from a single ground-based transmitter made at 3 spaced ground receiving stations.

3. Observations will be made on the Faraday rotation of satellite signals received. These will contribute to a large network scheme which is aimed at determining the distribution of irregularities with latitude.

4. Special observations will be made on the occurrence of spread-F irregularities in low latitudes. Special reduction of the ionograms and special back-scatter studies.

5. Records will be maintained of any abnormal VHF communication in the Island (Jamaica Telephone Company).

6. Records will be maintained of the frequency usage in the HF bands on communications over circuits of path lengths 400-1500 km (Cable and Wireless).

Japan

Revised Programme

WORLD DAYS.

The World Days Service is composed of five items mentioned below and is carried on by the Western Pacific Regional Warning Center in the Radio Research Laboratories, Ministry of Posts and Telecommunications.

1. *Interchange of Ursigrams.*

For prediction of abnormality in the solar and geophysical conditions, the current data summaries collected from the obser-

vatories in the Western Pacific region are sent to the World Warning Agency (Ft. Belvoir, U. S. A.) and other Regional Warning Centers. On the other hand, the current data summaries of similar kind are received from the World Warning Agency and other Regional Warning Centers.

2. *Ursigram Radio Broadcasting.*

Short-wave broadcasting is used for transmission in the Western Pacific region of the current data summaries, geoalerts, adalerts, satellite information, and other matters.

3. *Issue and Distribution of Advance Alerts.*

When the Western Pacific Regional Warning Center is satisfied on the basis of the current data summaries collected within its region that there is a solar activity event meeting the criteria stated for the issue of alerts, the Advance Alerts are issued to make the event known to all the region. At the same time, the Advance Alerts are transmitted also to the World Warning Agency and other Regional Warning Centers.

4. *World-Wide Alerts (Geophysical Alerts).*

The World-Wide Alerts are issued by the World Warning Agency on the basis of the Advance Alerts, para. 3 above, and other advices collected from various Regional Warning Centers when some abnormality is witnessed or expected, in the Agency's judgement, in the solar or geophysical conditions. Such World-Wide Alerts are also used for appointing and letting all know the Retrospective World Intervals proper for research and investigation. These Alerts issued by the World Warning Agency at 0400 U.T. are received by the Western Pacific Regional Warning Center, which in turn transmits them immediately within its own region.

5. *Collection and Distribution of Satellite Information.*

The Western Pacific Regional Warning Center is entrusted by C.O.S.P.A.R. with the collection and transmission of satellite information on behalf of the institutions interested in artificial satellites.

4. *Other Observations.*

4.1. Effects of the magnetic field on the airglow will be studied by observing the polarization of the 5577A line. *Station* : Gifu.

4.2. Observation of the twilight glow will be made. *Station* : Kakioka.

4.3. Monochromatic observation with whole-sky camera combining the interference filter will be carried out. *Stations* : Niigata and Dodaira.

IONOSPHERE.

The Work in progress at the Japanese ionospheric stations is summarised in the Table.

1. *Vertical Incidence Stations* : Wakkanai, Akita, Kokubunji and Yamagawa.

Soundings will be made at quarter-hour intervals daily and at five-minute intervals on World Days. $N(h)$ profiles will be calculated for selected days at Kokubunji.

2. *Absorption Measurements.*

2.1. *Method A1 (pulse reflections).* *Station* : Kokubunji.

Measurements will be made daily at noon on 2.0 and 2.4 Mc/s.

2.2. *Method A2 (Riometer).* *Stations* : Hiraiso and Uji.

Continuous measurements will be made at Uji on 15, 30 and 50 Mc/s. The station at Hiraiso will commence observations in August 1964.

2.3. *Method A3 (Field strength).* *Stations* : Akita and Hiraiso.

At Akita, the field strength of the sky-wave signal of the station JJY (distance 450 km) on 2.5 Mc/s will be measured. At Hiraiso, pulses from the LORAN station at Okamazaki (distance 361 km) on 1.85 Mc/s will be measured.

3. *Method D1 (Drift measurements).* *Station* : Yamagawa.

Measurements will be made during 20-minute intervals in each hour on 2.2 and 4.5 Mc/s on Wednesday and Thursday every week and on R.W.Ds and during W.G.Is.

4. *Whistlers.* *Stations* : Moshiri, Kakioka, Uji and Toyokawa.

Simultaneous observations of whistlers will be made at four stations from 20-22 and from 50-52 minutes after each hour. At Kakioka and Uji the frequency range is 1 kc/s to 20 kc/s. At Moshiri and Toyokawa the range is 400 c/s to 10 kc/s. The « nose effect » will be observed up to 100 kc/s.

5. Noise.

The propagation of atmospheric radio noise depends on the frequency and on conditions in the magnetosphere or the ionosphere. Observations of noise at various frequencies will be made to study these conditions and also to investigate the generation of ELF and VLF noise by the mutual action between charged particles and the magnetic field in the magnetosphere.

5.1. *Atmospheric noise in extremely low frequencies band. Stations :* Tottori and Uji.

The Department of Electronic Engineering, Kyoto University, developed a spectrum analyser to observe atmospheric noise in the ELF band at Uji and the Research Institute of Atmospherics, Nagoya University, established a new station at Tottori to observe the field strengths on 500 c/s and 250 c/s. The latter observation will begin in April 1964.

5.2. *Atmospheric noise in very low frequencies band. Stations :* Moshiri, Abashiri, Hiraiso, Kakioka, Uji and Toyokawa.

VLF atmospheric noise is observed at Moshiri (1-30 kc/s), Kakioka (1-20 kc/s), Uji (0.3-10 kc/s) and Toyokawa (0.03-30 kc/s).

Frequency analysis studies are made at Toyokawa to investigate the propagation mode at very low frequencies, the characteristics of the lower part of the ionosphere, and S.E.A. phenomena.

The field strength of atmospheric radio noise on 10, 21 and 27 kc/s is observed at Toyokawa. In addition, field strength on 2, 4 and 6 kc/s is observed simultaneously at Moshiri and Toyokawa. The polarization and arrival angle on 5 kc/s are continuously measured at Moshiri. In order to study the instillment point of the VLF emission into the atmosphere of the earth, a new station has been established at Abashiri to make simultaneous observations with Moshiri from May to October.

5.3. *Atmospheric noise in low frequencies band. Station :* Toyokawa.

The pulse rates at three different levels of atmospheric noise on 50 kc/s and 100 kc/s are observed for ten minutes every hour to obtain the diurnal and seasonal variation and to study unusual characteristics at the time of ionospheric disturbance. It is

planned to study the statistical phenomena of the field strength by recording the wave form of the atmospheric noise at low frequencies at the time of falling of a thunderbolt from the summer of 1964.

5.4. *Atmospheric noise in high frequencies band. Station :* Ohira.

Atmospheric noise on 2.5, 5, 10 and 20 Mc/s is measured for 15 minutes in every hour to clarify the relationship between noise in the hf band and radio communications.

6. *Special Propagation Experiment. Station :* Yamagawa.

In order to investigate trans-equatorial radio propagation, continuous recordings will be made at Yamagawa of transmissions from Darwin (Australia) on 32.85, 49.00 and 72.76 Mc/s. These stations have approximately conjugate magnetic coordinates. The experiment will begin in May 1964.

7. *Back-scatter Observations. Station :* Hiraiso.

In order to study ionospheric propagation, especially across the equator, back-scatter reflections will be recorded once an hour during World Days on 27 Mc/s using a rotating aerial.

8. *Radio Observation of Satellites. Stations :* Kokubunji and Uji.

The Doppler frequency shift and the Faraday rotation will be observed at these two stations. Observations at Uji will begin in August 1964.

Telemetered signals from some satellites will be recorded at Kokubunji.

SOLAR ACTIVITY.

2. *Radio Observations.*

2.1. *Intensity and polarization (Mitaka).*

Continuous observations will be made at 200, 300, 9,500 and 17,000 Mc/s : 00 h to 07 h U.T.

2.2. *Intensity and polarization (Toyokawa).*

Continuous observations will be made at 1000, 2000, 3750 and 9400 Mc/s : 23 h-06 h in winter and 03 h-08 h in summer.

2.3. *Brightness distribution (Toyokawa).*

One-directional drift curves will be taken for 2 hours per day near noon with multi-element compound interferometer at 9400 Mc/s (beam width of 0.7') and also with an eight-element interferometer at 4000 Mc/s (beam width of 4.5').

2.4. *Intensity (Hiraiso).*

Continuous observation will be made at 200 and 500 Mc/s.

Nishina-type ionization chambers have been continuously operated since 1947 and a great deal of information, particularly for the study of longterm variation, has been obtained.

SPACE RESEARCH.

The following programme has been proposed by the Japanese Rocket Group. The firing place for Japanese rockets is located at Uchinoura in the south-east of Kyushu Island and its coordinates are 31°15'N and 131°05'E. The proposed items for observations are as follows. The number of rockets available is expected to be about ten to fifteen per year and one rocket can bear about three kinds of sensors on average.

2. *Ionosphere and exosphere.*

2.1. Densities of electrons and ions and electron temperature up to about 800 km (resonance probe, Langmuir probe, impedance probe).

2.2. Ion composition up to about 800 km (mass spectrometer).

2.3. Energy spectrum of charged particles up to about 800 km.

2.4. Collision frequency near the E region.

4. *Radio waves.*

4.1. Radio noise at VLF, LF and MF up to about 800 km.

4.2. Radio wave propagation at VLF up to about 800 km.

4.3. Whistlers and VLF emissions up to about 800 km.

Mexico

IONOSPHERE.

1. *Vertical Incidence Soundings (Ministry of Communication).*

Synoptic soundings are being made with a C4 ionosonde at the Cerillo Station in the frequency range 0.25 to 20 MHz.

2. *Riometer* (Institute of Geophysics in cooperation with the Outer Space Commission).

The purchase of a riometer is planned in order to study the cosmic noise absorption.

Pakistan

IONOSPHERE.

Delete existing text and insert the following :

The observations will be taken at Quetta.

Ionograms of vertical incidence soundings will be obtained every hour by means of automatic multifrequency ionosonde. On World Days and Geophysical World Intervals, efforts will be made to obtain vertical soundings after every 15 minutes.

Continuous intensity records will be maintained of the signals transmitted from the beacon transmitter in Japan (when set up).

Characteristics to be deduced from the Ionograms.

f_oF2 , f_oF1 , f_oE_s , f_oE , f_{min} .

$h'F2$, $h'F1$, $h'E_s$, $h'E$,

$M(3000)F2$, $M(3000)F1$.

The above values will be in the form of monthly summary tables giving instantaneous values of each characteristic separately. The total count, median hourly values and quartile ranges of all the characteristics listed above will be calculated, f -plot will be produced for R.W.Ds and S.W.Is.

Poland

IONOSPHERE.

1. Vertical incidence ionospheric sounding : routine sweep-frequency records have been maintained at Miedzeszyn.

2. Absorption measurement programme at Pwnice-Torun in preparation.

EXOSPHERE.

The systematic sounding of the exosphere during certain hours has been carried on using the equipment with the magnetic memory and the radio signal level of selected stations.

The investigations are carried out in relation to the following questions :

1. Does the time difference of echo reflections exist for the light and the dark hemispheres?
2. How often are there only two rings of stratification around the globe?
3. How often are there three rings?
4. The correlation of it with the soundings of ionosphere.
5. The correlation of it with the meteor showers.
6. Simultaneous observations of the radioechoes on different sounding frequencies.
7. The relationship with sunspots and with solar eruptions.

SOLAR ACTIVITY.

Radio-observations of the Sun at the N. Copernicus University, Torun.

2.1. Interferometric observations of the weak sources of enhanced solar radiation at 127 Mc/s.

Tentative observations were made from March to September 1963. The receiving system which is used for this work provides facilities for recording the radiation of the Sun's active regions of small angular dimensions, about 5', and flux larger than one tenth of the quiet Sun flux. The observations will be continued in the period March-September 1964.

2.2. Precise monitoring of the solar flux at 127 and 327 Mc/s with the emphasis on the observations during the solar eclipses in any part of the world.

Observations on these frequencies are made from 09 to 15 U.T. The data in form of the monthly tabulations of the daily mean values of the solar flux and of the unusual phenomena at 127 Mc/s are made and delivered to the I.Q.S.Y. Analytical Centre C1 (Eidgenössische Sternwarte, Zürich) and later published in the

« *Quarterly Bulletin of Solar Activity* ». The data are also delivered to the Radiophysics Laboratory, C.S.I.R.O., Sydney. The data concerning the solar radiation on 327 MHz have not been analyzed.

2.3. The investigations of the outer solar corona during the occultations of the radio sources include coronal scattering depending on the phase of the sunspot cycle, the coronal extent and the magnetic field, the influence of solar activity on the interplanetary medium, researches on the intensification of the radio waves at and beyond the normal extent of the coronal scattering.

Observations of the solar corona with the method of occultation of the radio source TAURUS A will be carried on in June 1964 when the position of this radio source will be mostly convenient for the observations. Data will be afterwards analyzed according to the above mentioned aspects.

Brazil

Addition to I.Q.S.Y. Programme

The following additional project is the responsibility of Dr. Fernando de Mendonça of the Comissão Nacional de Atividades Espaciais.

Around-the-world propagation experiment consisting in the simultaneous and continuous reception of four HF channels transmitted from Okinawa. The receiving stations are located in Salonika (Greece), Malta, São José dos Campos (Brazil) and in Guam. The main objective is to determine characteristics of ionospheric duct propagation and also antipodal reception (at São José dos Campos). The measurements made at São José dos Campos were performed continuously from March 8 through May 2, 1964; they will be repeated at change of seasons.

Address : Dr. Lelio I. Gama, Observatorio Nacional, R. General Bruce, 586, S. Cristóvão, Rio de Janeiro.

U. S. S. R.

Progress Report on I.Q.S.Y. Programme (April 1964)

The following report has been received from Dr. N. V. Pushkov, President of the I.Q.S.Y. Working Group of the Soviet Geophysical Committee.

In order to carry out the I.Q.S.Y. programme, work is proceeding in accordance with the recommendations adopted at the Paris (March, 1962) and the Rome (March, 1963) I.Q.S.Y. Assemblies.

The U. S. S. R. programme specifies participation in the following disciplines : *meteorology* (aerology-radiosounding and meteorological rockets; actinometry — surface and high-altitude observations; radiogoniometric observations of atmospheric electricities; atmospheric electricity — surface and airborne observations; ozone; noctilucent clouds); *earth currents and geomagnetism*; *aurora and airglow*; *ionosphere and meteors*; *solar activity and comets*; *cosmic rays*; *observations made in satellites and rockets*.

A regional Euro-Asiatic Reporting Centre has been established in the U. S. S. R. and is carrying on its work in Moscow at the Institute of Geomagnetism, Ionosphere and Radio Wave Propagation (IZMIR) of the Academy of Sciences of the U. S. S. R.; its subcentre is working in Irkutsk at the Siberian Institute of Geomagnetism, Ionosphere and Radio Wave Propagation of the Siberian Department, Academy of Sciences of the U. S. S. R. During the preparatory period, from 1st October-31st December 1963, the Regional Centre checked up the whole communication network for the transmission of alert messages.

Before 1st January 1964, the preparation was completed of the network of stations and observatories in the U. S. S. R. for the beginning of observations on the I.Q.S.Y. programme; this included the provision of instruments and experienced observers. Instruction manuals concerning the observational procedures and the transmission of data to WDC-B in Moscow were drawn up, published and brought to the notice of the observers. Almost all the stations and observatories had already taken part in the I.G.Y. and have had experience in conducting coordinated geophysical observations on international programmes. The whole territory of the U. S. S. R. is covered by observations and they are also made in Antarctica.

WDC-B in Moscow is ready for the receipt, filing and exchange of the results of observations from the world network of I.Q.S.Y. stations and observatories. Special instructions on the transmission of observational results to the WDC have been prepared for each section of the I.Q.S.Y. programme. The work of the

WDC is arranged in full conformity with the « Instruction for International Exchange of Data through the WDCs » approved by the Comité International de Géophysique in August 1963.

IONOSPHERE.

Observations of the ionosphere are made at 22 stations. Vertical sounding is carried out at 21 stations two of which are in Antarctic ; one is a drifting station in the Arctic. High-latitude stations make soundings every 15 minutes.

Absorption measurements are carried out at 7 stations by the pulse method (A1).

Ionospheric drift observations are made at 7 stations. In Moscow, drift observations by this method are made with the aid of two installations ; the aerial spacing is small at one of these and large (about 30 km) at the other.

Photographic and visual observations of meteor trails are carried out at 4 stations ; the data are used to determine airflows in the meteor zone of the atmosphere at heights of 60-120 km.

Note. — A list of U. S. S. R. stations for I.Q.S.Y. is appended to the report.

FEDERATION OF ASTRONOMICAL AND GEOPHYSICAL SERVICES

Minutes of the Paris meeting

At a meeting of the Council of F.A.G.S. held at 39 *ter* rue Gay Lussac, Paris, on Saturday 23 May, 1964.

Present : Prof. P. TARDI (I.U.G.G.),
Prof. J. VELDKAMP (I.U.G.G.),
Dr. B. GUINOT (I.A.U.),
Mr. A. H. SHAPLEY (U.R.S.I.),
Prof. G. D. GARLAND (*Secretary*),
Ing. Gén. G. R. LACLAVÈRE (*Past Secretary*).

Dr. J.-C. Pecker (I.A.U.) and Dr. E. M. Fournier d'Albe (U.N.E.S.C.O.) attended by invitation.

Apologies for absence were received from Col. E. Herbays and Prof. M. Waldmeier. Dr. A. F. Moore, Scientific Secretary (F.A.G.S.) was in attendance.

1. MINUTES OF THE LAST MEETING

The minutes of the meeting of the Council of F.A.G.S. held in Vienna on 28 November 1963 were confirmed after making the following amendments :

Replace page 5 paragraph 7 lines 16-18 « and for the correlation of gravity anomalies revealed by the perturbation of satellite orbits with those obtained by surface measurements, « by » and for a pilot study for putting gravity data on punched cards ».

Replace paragraph 12, page 9, line 10 of the table « I.U.W.D.S.-3000-1500 » by « I.U.W.D.S.-4750-1500 ».

Mr. Shapley explained that in connection with paragraph 4 of the minutes relating to the I.U.W.D.S. report for the I.C.S.U. General Assembly, 1963, the reminder had only reached him just

before the deadline. The annual report of the I.U.W.D.S. for 1963 would soon be ready and this would provide all the information required.

2. MEMBERSHIP OF THE F.A.G.S. COUNCIL

The Secretary reported that the membership of the Council was as follows :

Prof. P. TARDI (I.U.G.G.)	Col. E. HERBAYS (U.R.S.I.)
Dr. J. VELDKAMP (I.U.G.G.)	Mr. A. H. SHAPLEY (U.R.S.I.)
Dr. B. GUINOT (I.A.U.)	Prof. G. D. GARLAND (<i>Secretary</i>)
Prof. M. WALDMEIER (I.A.U.)	Ing. Gén. G. R. LACLAVÈRE (<i>Past Secretary</i>).

Mr. L. de Feiter would be an alternate U.R.S.I. representative. It was understood that the matter of the I.C.S.U. representative on the Council of F.A.G.S. would be discussed at the next meeting of the I.C.S.U. Executive Committee and the F.A.G.S. President agreed to write to the President of I.C.S.U. advising him that someone closely connected with I.C.S.U. financial affairs would be very welcome on the Council.

3. ELECTION OF F.A.G.S. VICE-PRESIDENT

It was reported that at the last meeting of the Council of F.A.G.S. it had been agreed that the I.A.U. and the U.R.S.I. should make a joint nomination for the election of the F.A.G.S. Vice-President. The Secretaries General of these 2 Unions had considered the matter bearing in mind that the Vice-President had to be elected from amongst the members of the Council.

The Council considering that some of the members were either new members or found it somewhat difficult to attend the meetings, expressed the hope that Mr. D. H. Sadler (I.A.U.) might eventually become a member of the Council of F.A.G.S. and so be eligible for nomination as F.A.G.S. Vice-President. It was agreed to postpone the election until Mr. Sadler's views had been obtained.

4. FINANCIAL MATTERS

(a) *International Polar Motion Service.*

As no grant had been made in 1962 to the I.P.M.S. Central Bureau in Japan, it had been agreed with the Acting Director,

Dr. S. Yumi, that whenever possible grants of \$ 1000 each would be made to him until any deficit had been wiped out.

It is possible that Dr. Yumi is providing for the publication of his 1962 annual report from 1962 funds and similarly for his 1963 report from 1963 funds. However, other permanent services charge the costs of producing their annual volumes to the year in which they are printed and not to the year to which the data refers, e.g. the I.S.S. 1957 data published in 1963 is a charge on the 1963 grant and the data on Geomagnetic Indices for 1959 published in 1963 are also a charge on the 1963 grant. Dr. Yumi on 31 December, 1963, had a balance of \$ 3580 and this lends support to the above considerations. It was agreed to discuss the matter in detail with Dr. Yumi in order to ascertain his actual deficit.

The F.A.G.S. Secretary stated that he had visited Prof. Cecchini en route to the meeting and that he had been very impressed with the magnitude of the work that still remained to be done in Turin before the final publication would be ready in 1967. Prof. Cecchini has asked for an annual F.A.G.S. grant of \$ 250 p.a. for 1965, 1966 and 1967; the remainder of his expenses would be borne by the Italian Geodetic Commission.

It was reported that in the period 1958-1960 the C.I.G. had made grants to F.A.G.S. totalling \$ 13 000 to analyse and publish the increased data arising from the I.G.Y.

Much of the I.G.Y. data has been printed in the *Annals* of the I.G.Y. but no material for the volume on the I.G.Y. latitude programme, for which some of the above grant had been used, had yet been received by the C.I.G. However, the reduction by the International Latitude Service in Turin of the measurements made in 1957-1959 at 5 International Latitude Observatories has already been published by Prof. Cecchini in publication No. 20 of the Italian National Commission for International Geophysical Cooperation.

It was agreed to recommend to the C.I.G. that permission be sought from Prof. Cecchini and the Consiglio Nazionale delle Ricerche, Rome, to reprint some of that material in the *Annals of the I.G.Y.*

(b) *International Seismological Summary.*

It was reported that at a U.N.E.S.C.O. Inter-Governmental Meeting on Seismology and Earthquake Engineering held in Paris,

21-30 April, 1964, resolutions had been adopted welcoming the establishment of the International Seismological Centre in Edinburgh (which would in future be responsible for the I.S.S.), urging U.N.E.S.C.O. and I.A.S.P.E.I. to cooperate in seeking means for the permanent support of the Centre, and calling on the Member States to assist in these efforts.

A resolution had also been adopted which recognised the long continued and important work of the Bureau Central of the I.A.S.P.E.I., stressed that its work should be continued without interruption, and called on National and International organizations to continue their support.

The U.N.E.S.C.O. conference had recommended that the I.A.S.P.E.I. set up a committee to advise U.N.E.S.C.O. about the implementation of all the conference resolutions and that U.N.E.S.C.O. should explore the possibility of setting up an international fund for the development of Seismology and Earthquake Engineering. It was understood that extra funds for the new Centre in Edinburgh would only become urgent in 1966 and in the light of the above recommendations to U.N.E.S.C.O. it was agreed to await further developments.

(c) *Bureau International de l'Heure.*

In recent years the grant to the Bureau International de l'Heure, of the order of \$ 14 000, has been the largest item in the F.A.G.S. budget. This was partly due to the necessity of analysing the large amount of data arising from the I.G.Y. Longitude Programme. This particular programme will be partially completed in 1964 and there will be a consequent reduction in the B.I.H. budget for 1965 onwards to about \$ 8000 per annum.

Some of the money from the C.I.G. grant mentioned in the paragraph 4 (a) above, had been used to finance the reduction of I.G.Y. longitude determinations, but as yet no longitude material had been received by the C.I.G. for publication in the *Annals of the I.G.Y.* The President of F.A.G.S. reported that during recent discussions with Dr. Stoyko he had been shown a draft of the first half of the report destined for the *Annals of the I.G.Y.* The section dealing with wave propagation still had to be compiled. As the deadline for the submission of material for the *Annals* had been fixed for 1 June 1964 and as the Markowitz Moon Camera

data would not appear in the series, it was agreed to recommend to the C.I.G. that the work already completed by Dr. Stoyko be published in the *Annals* and that the remainder be published in the normal scientific literature. Prof. Tardi undertook to urge Dr. Stoyko to submit the above material, at the latest, by 31 July 1964.

5. — U.N.E.S.C.O. CONTRACTS

(a) *Studies of K indices.*

It was reported that a contract for \$ 2500 to assist with the expenses of Father Mayaud's tour of Geomagnetic Observatories to standardise the scaling of K indices had been signed and that the first instalment of \$ 2000 had been received. During the course of a six months tour Father Mayaud had been to 28 different cities and examined records from 48 observatories. He had been to such places as Addis-Ababa, Cape Town, Bombay, Christchurch, Tokyo, Washington, Buenos-Aires and Rome. His air ticket had cost over \$ 3400 and the money received from U.N.E.S.C.O. was being used to pay part of that cost.

I.A.G.A. was also making a contribution towards these expenses. The results of his studies would probably be published as 2 Volumes in the series of *I.A.G.A. Bulletins* and the work of the Permanent Service would be improved as a result of his efforts.

(b) *Survey of tide gauge distribution.*

It was reported that the Intergovernmental Oceanographic Commission has granted a contract of \$ 1000 for the Permanent Service on Mean Sea Level to carry out a survey of existing properly maintained tidal stations and to make proposals for new ones. The contract had also called for the production of several reports and maps in several hundred copies for use by the I.O.C. at its meeting in Paris in June 1964.

(c) *Fluctuations of glaciers.*

It was reported that negotiations between F.A.G.S. and the I.A.S.H. Commission on Snow and Ice about a pilot study to analyse data on the fluctuations of glaciers had continued since the last meeting and some preliminary discussions had also been held with U.N.E.S.C.O. about a possible contract for such work.

Just before the meeting a request had been received from Professor A. Renaud (Lausanne) who stated that he was willing to undertake the pilot study so long as \$ 11 000 per annum could be granted for the period of the pilot study. A large part of this sum was for Prof. Renaud himself and this being an honorarium, could not be paid by F.A.G.S. as it would be contrary to I.C.S.U. policy. The F.A.G.S. Secretary stated that he would be discussing the matter with Prof. Renaud the following week and would explore the possibility of either the Swiss Government or a Swiss University supporting Prof. Renaud.

(d) Analysis of gravity data

It was stated that a contract of \$ 3000 for a pilot study to put the gravity data held by the Bureau Gravimétrique International on to punched cards had been prepared by U.N.E.S.C.O. and would soon be ready for signature.

The Council of F.A.G.S. expressed its deep appreciation for all this valuable support from U.N.E.S.C.O.

6. — APPLICATION FOR MEMBERSHIP FROM S.P.A.R.M.O.

The Solar Particles and Radiations Monitoring Organisation has as President : Prof. A. EHMERT (Germany),
as Vice-Presidents : Prof. H. ELLIOT (U. K.),
Prof. C. de JAGER (Netherlands)
and Dr. J. P. LEGRAND (France) as Executive-Secretary.

Institutes in the Federal Republic of Germany, Argentina, France, Great Britain, Italy, Norway, Netherlands and Sweden, participate in S.P.A.R.M.O. and the institutes in Australia, Belgium, Bolivia, Chile, Denmark, Japan, South Africa, Switzerland and Czechoslovakia are connected with its work with balloon borne experiments.

As had been advised at the previous meeting, the S.P.A.R.M.O. had requested the I.A.U. to consider its application for membership of F.A.G.S. and to present its case to the Council of F.A.G.S. The I.A.U. had received enthusiastic support for the proposal from Prof. C. W. Allen, President of the Inter-Union Commission on Solar and Terrestrial Relationships and so supported the application from S.P.A.R.M.O. However, the I.A.U. had also

asked the I.U.G.G. to sponsor the application as well. The matter had been discussed by the I.U.G.G. Bureau which had decided to support the application so long as the I.A.G.A. were in agreement. No decision has yet been reached by the I.A.G.A. and it was agreed to deal with the matter by correspondence once these views were known. The Directing Committee of any Permanent Service which might be set up would need to have a representative of I.A.G.A. on it.

The Statutes of S.P.A.R.M.O. would also be circulated along with the views of I.A.G.A. so that members would be assured that the organisation was truly international. It was understood that S.P.A.R.M.O. would welcome an annual grant from F.A.G.S. of \$ 800 to assist its works.

7. — TRAVEL EXPENSES

F.A.G.S. Statutes 16-17 (I.C.S.U. Year Book 1963, pages 76-79) relate to travel expenses to meetings of the Council of F.A.G.S. but do not specifically provide for travel on Permanent Service business.

Mr. LACLAVÈRE explained that when the statutes were drawn up the F.A.G.S. budget was only 20 % of its current amount and all the income was required for publication purposes. The F.A.G.S. Secretary remarked that since the Federation had been founded, the I.C.S.U. international programme, the I.G.Y. and the I.Q.S.Y. etc., had come into existence and it was necessary for Permanent Service Directors to attend meetings in connection with such programmes.

M. Shapley stressed that national groups contributed \$ 500 000 p.a. for the operation of the I.U.W.D.S. The F.A.G.S. grant to the I.U.W.D.S. supported the coordinating work of its Steering Committee whose members had to keep in close contact with the scientific community. It was very desirable that the I.U.W.D.S. Secretary or Deputy-Secretary attended all the meetings of the Steering Committee and this automatically involved travel expenditure. Close relations also had to be maintained with other members of the I.C.S.U. family and it was for this reason that expenditure had been incurred in connection with the I.Q.S.Y. Assembly, Rome, March 1963, and the C.O.S.P.A.R. meeting in Florence, May 1964. I.U.W.D.S. travel expenditure was also incurred on journeys between Utrecht and Brussels.

It was agreed to recommend to the I.C.S.U. Executive Committee and the participating Unions that Statute No. 15 be amended to read « The cost of travel and subsistence on essential Permanent Service business may be charged to the allocation of F.A.G.S. funds to that Service so long as it had been included in advance in the budget of the Service and approved by the Council of F.A.G.S. »

8. — REVISION OF THE STATUTES OF F.A.G.S.

The F.A.G.S. Secretary reminded the Council that in 1962 the I.C.S.U. Executive Board approved the appointment of a part-time F.A.G.S. Scientific Secretary and at the same time decided to distribute the U.N.E.S.C.O. subvention to I.C.S.U. on a percentage basis to the Scientific Unions. These two decisions called for some major revisions of the F.A.G.S. Statutes and these are presented in detail below along with some other amendments.

(a) *Statute No. 3.*

In order to bring the list of Permanent Services up to date, it was proposed to replace « 2. International Latitude Service » by « 2. International Polar Motion Service » (I.P.M.S.) and to combine 8 and 11 to read « 8. International Ursigram and World Days Service » (I.U.W.D.S.).

(b) *Statute No. 5.*

Consequent upon the reorganisation of the I.C.S.U. in November 1963 it was agreed to replace in Statute No. 5 « representative of the Bureau of I.C.S.U. » by « member of the I.C.S.U. Executive Committee. »

(c) *Statute No. 6.*

As the work of the Council of F.A.G.S. has increased during the past few years and in order to facilitate making the annual grants to the Permanent Services, it was agreed to change the first phrase in Statute 6 from « The Council shall meet every two years » to « The Council shall meet every year. »

(d) *Statutes No. 12-15 and 17.*

As a result of the percentage distribution of the U.N.E.S.C.O. subvention to I.C.S.U., the Union contributions to the costs

of the F.A.G.S. Secretariat are now contained in the annual I.C.S.U. grant to F.A.G.S. In addition, provision must be made for the salary of the part-time Scientific Secretary. It was proposed to replace Statutes 12-15 and 17 by «The Federation may employ a part-time Scientific Secretary to draft scientific reports on the work of F.A.G.S., to assist in the negotiations for subventions and contracts etc., under the direction of the Secretary.»

«The operation costs of the F.A.G.S. Secretariat shall be a charge on the money granted to F.A.G.S. by I.C.S.U.»

«The total annual cost of the F.A.G.S. Secretariat including salaries, travel of officers (see statute No. 16) correspondence, etc., shall not exceed 8 % of the total funds paid direct to F.A.G.S. in a given year. This percentage shall be reviewed from time to time.» It was agreed that this total of 8 % should be reconsidered every 2 or 3 years.

(e) *New statutes.*

It was agreed that the F.A.G.S. funds received from U.N.E.S.C.O. should be used entirely for the technical and scientific work of the Permanent Service and should not be used for travel expenses or for the operation of the Secretariat.

In order to distinguish between the two principal sources of F.A.G.S. funds the following new Statute was proposed :

«The subventions received from U.N.E.S.C.O. shall be used entirely for the scientific work of the Permanent Services, i.e. for analysis, and the preparation and printing of publications. The other costs shall be charged to the grants from I.C.S.U.» It was agreed that in future years the distribution of F.A.G.S. funds should be made so that each Permanent Service would know the amount it has received from the U.N.E.S.C.O. subvention and the amount it has received from the I.C.S.U. subvention.

The following new Statute, in line with current I.C.S.U. practice, was proposed : «The Directors of Permanent Services and Senior Scientists connected with them are not entitled to receive any honoraria or salaries from F.A.G.S. funds.»

All these changes need to be ratified by the I.U.G.G., the I.A.U. and the U.R.S.I., as required by Statute No. 20, which also requires that they be ratified by the Executive Committee of I.C.S.U. The new version of the Statutes of F.A.G.S. incorporating all the above proposals are given in an appendix to this report.

9. — STATUS OF RELATIONS WITH U.N.E.S.C.O.

As it is not possible for U.N.E.S.C.O. under the terms of its directives governing relations with non-governmental organisations to pay more than one annual subvention to a family of organisations, the U.N.E.S.C.O. will pay \$ 22,000 extra to I.C.S.U. in 1965, and earmark that sum specifically for payment to F.A.G.S. Consequently, the U.N.E.S.C.O. subvention to I.C.S.U. will be increased without any direct benefit to I.C.S.U. itself and it was considered that the I.C.S.U. might have objections to this procedure. A solution to this problem was for F.A.G.S. to apply for admission into status B relations with U.N.E.S.C.O. whilst I.C.S.U. itself retained its status A relations. If such an application was granted by U.N.E.S.C.O. then it would be possible to separate the two subventions.

Before such an application was made to U.N.E.S.C.O. it was decided to seek the views of the I.C.S.U. Executive Committee in relation to the wider problem of the permanent members of the I.C.S.U. family, e.g. Scientific Committees etc., seeking separate status with U.N.E.S.C.O.

10. — SUBMISSIONS TO THE I.C.S.U. EXECUTIVE COMMITTEE

It was decided to submit to the President of I.C.S.U., for possible consideration by the I.C.S.U. Executive Committee in June 1964, the following matters for decision :

- (a) Amendments to the F.A.G.S. Statutes.
- (b) Application for membership of F.A.G.S. from the Permanent Service on Crustal Thickness.
- (c) F.A.G.S. budget for 1965.
- (d) Status B relations with U.N.E.S.C.O.

11. — REMAINDER OF 1963 SUBVENTION

At the previous meeting of the Council \$ 5000 had been transferred from the 1963 subvention for expenditure in 1964. A further \$ 1700 had remained unallocated and it was decided that this sum should also be transferred for expenditure in 1964.

12. — FINAL FINANCIAL ALLOCATIONS FOR 1964

It was reported that the total income of F.A.G.S. in 1964 consisted of :

From U.N.E.S.C.O.	\$ 22000
From ICSU	\$ 17000
Transfer from 1963	\$ 6700
Total	\$ 45700

It was reported that all the Permanent Service accounts for 1963 had been audited and the balances held by the Permanent Services on 31 December 1963 are given in the third column of the table below. Having regard to the Permanent Service budgets for 1964 and the first allocation for 1964 which totalled \$ 24 150 the Council made a second allocation of the remaining \$ 21 550 as given in the last column but one of the table below.

The I.U.W.D.S. agreed to accept a lower grant by postponing a project until 1965. The grant of \$ 1500 to the I.P.M.S. consists of \$ 500 for 1964 and \$ 1000 as a contribution towards the sum that should have been granted for 1962.

1964 GRANTS

	1964 Request	1963 Balance	1st Instalment 1964	2nd Instalment 1964	Total Paid 1964
	\$	\$	\$	\$	\$
B.I.H.	15 800	2 768	5 500	5 500	11 000
I.L.S.	500	—	—	—	—
I.P.M.S.	6 000	3 591	2 500	1 500	4 000
B.G.I.	3 000	2	1 500	1 500	3 000
Geomag.					
Indices	5 000	1 812	2 000	1 250	3 250
I.S.S.	7 000	—	3 500	3 000	6 500
B.C.I.S.	6 000	—2 136	2 250	3 700	5 950
M.S.L.	4 000	—367	1 500	2 500	4 000
Solar Activity	2 000	509	900	600	1 500
I.U.W.D.S. ..	4 750	2 472	1 000	500	1 500
Earth Tides .	3 000	2	1 500	1 500	3 000
Crust. Thick.	1 000	—	—	—	—
Admin.	4 000	1 771	2 000	—	2 000
Total	62 050	10 424	24 150	21 550	45 700

Members desired to have more current information about the work being undertaken by each Permanent Service and it was agreed that the following documents were required in order that the Council could operate efficiently ;

- (a) the financial accounts for the preceeding year should be submitted each January, and
- (b) an annual report on the activities undertaken in the previous year should also be submitted each January.

As the F.A.G.S. income is allocated twice each year it is necessary to have :

- (c) on 1 May each year a revised budget for the current year and
- (d) also on 1 May each year a budget for the following calendar year ;
- (e) on 1 May each year a brief report on any matters of importance should also be submitted.

It was agreed that it was difficult for the above requirements to be less frequent because the amount of the annual subvention from I.C.S.U. was not known until late in the preceeding year and the U.N.E.S.C.O. subvention was liable to be changed at the end of each of its 2 year financial cycles.

It was agreed to hold the next meeting of the Council of F.A.G.S. in late 1965 and to agree on the first allocation for 1965 by correspondence in late 1964.

The Secretary, Prof. G. D. Garland, stated that he was at present engaged on a tour of those Permanent Services which are situated in Europe and was looking forward to discussing Permanent Service problems with the Directors in May/June 1964.

Statutes of F.A.G.S. (awaiting ratification)

I. — ESTABLISHMENT AND AIMS OF THE FEDERATION

(1) A Federation of Permanent Services of Astronomy, Geodesy, Geophysics and related sciences shall be established within the framework of the International Council of Scientific Unions (I.C.S.U.).

(2) For the purpose of the present Statutes, a Permanent Service shall be a scientific organisation placed under the authority of one or several scientific members of I.C.S.U. and entrusted with the following tasks :

- to collect, as a continuous activity, observations, information and data relating to the sciences referred to under paragraph 1 above ;
- to analyze and synthesize them ;
- to draw conclusions from them ;
- to distribute data on request ;
- to publish the results obtained.

Each Permanent Service shall be placed under the authority of a Board which shall include the Director of the Service ; the composition of each Board shall be decided by the interested Union or Unions, which shall also appoint the Director.

II. — COMPOSITION OF THE FEDERATION AND CONDITIONS OF MEMBERSHIP

(3) The Federation shall include the following Permanent Services :

1. International Time Bureau (I.A.U.-I.U.G.G.),
2. International Polar Motion Service (I.U.G.G.-I.A.U.),
3. Permanent Service of Geomagnetic Indices (I.U.G.G.),
4. International Gravimetric Bureau (I.U.G.G.),
5. International Seismological Summary (I.U.G.G.),
6. International Seismological Bureau (I.U.G.G.),
7. Quarterly Bulletin of Solar Activity (I.A.U.),
8. International Ursigram and World Days Service (U.R.S.I.-I.A.U.-I.U.G.G.),
9. Permanent Service on Mean Sea Level (I.U.G.G.),
10. Permanent Service on Earth Tides (I.U.G.G.).

(4) Other Permanent Services fulfilling the conditions set out under paragraph 2 above may be added to the Federation. Applications for membership shall be sent to the Secretary of the Federation by and with the approval of one of the Unions concerned.

The applications shall then be submitted to the Council for advice and the final decision shall be made by I.C.S.U. in accordance with paragraph 6 below. The same procedure shall apply to withdrawal.

III. — ADMINISTRATION

(5) The Federation shall be administered by a Council composed of :

two representatives of each Union having one or more Permanent Services ;

the Secretary of the Federation ;

the past Secretary ;

a representative of the I.C.S.U. Executive Committee.

U.N.E.S.C.O. shall be invited to send an observer to the meetings of the Council.

(6) The Council shall meet every year on a date set in agreement with the General Secretary of I.C.S.U. At these meetings, the Council shall adopt the budget of the Federation for the forthcoming period of one year. It shall approve the financial accounts submitted by the Secretary of the Federation. It shall examine the applications for membership received from new Permanent Services or suggestions from Unions for the withdrawal of existing Permanent Services and forward them with its comments to I.C.S.U. for final decision.

Extraordinary meetings of the Council may be convened by the Chairman.

(7) The Council shall elect from its members a Chairman and a Vice-Chairman ; the Council shall also appoint a Secretary who need not initially be one of its members.

(8) The Chairman and the Vice-Chairman of the Federation shall be elected for a period of four years following the election meeting. They shall not be re-eligible for a consecutive period. If the Chairman resigns or is unable to exercise his functions, the Vice-Chairman shall replace him until the next meeting of the Council.

(9) The Secretary of the Federation shall be elected for a period of 4 years and may be re-elected for consecutive periods of two

years. He shall be a member of the Council during the period of two years following his term of office.

(10) The Secretary of the Federation shall have the following functions :

present to I.C.S.U. the financial requests together with the necessary explanations ;

notify the Permanent Services of the sums made available to them according to the breakdown decided by the Council ;

obtain from the Permanent Services the information necessary for the establishment of the reports on the use of funds allocated to them by the Federation ;

centralize requests, comments, etc. from the Permanent Services and Unions ;

receive and deal with applications for membership or suggestions for withdrawal ;

inform I.C.S.U. and the scientific Unions of all important matters concerning the Permanent Services.

(11) The scientific management of each Permanent Service shall be ensured by the Director under the authority of the Board, which shall determine, in consultation with the interested International Organizations, the nature of the work to be carried out.

(12) The Federation may employ a part-time Secretary to draft scientific reports on the work of F.A.G.S., to assist in the negotiations for subventions and contracts etc., under the direction of the Secretary.

IV. — FINANCES

(13) The operation costs of the F.A.G.S. Secretariat shall be a charge on the money granted to F.A.G.S. by I.C.S.U.

(14) The total annual cost of the F.A.G.S. Secretariat including salaries, travel of officers (see statute No. 16) correspondence, etc., shall not exceed 8 % of the total funds paid direct to F.A.G.S. in a given year. This percentage shall be reviewed from time to time.

(15) The cost of travel and subsistence on essential Permanent Service business may be charged to the allocation of F.A.G.S.

funds to that Service so long as it has been included in advance in the budget of the Service and approved by the Council of F.A.G.S.

(16) The travel expenses of the representatives of the Unions and of the I.C.S.U. to F.A.G.S. Council meetings shall be borne by those organisations; the travel expenses to F.A.G.S. Council meetings of those officers who are not Union representatives shall be charged to F.A.G.S. funds.

(17) The Directors of Permanent Services and Senior Scientists connected with them are not entitled to receive any honoraria or salaries from F.A.G.S. funds.

(18) The Directors of Permanent Services shall notify the Secretary of the Federation of any funds or other aid which they receive directly from any source.

(19) The Directors of Permanent Services shall report on the use of the funds which have been allocated to them to the Secretary of the Federation.

(20) The subvention received from U.N.E.S.C.O. shall be used entirely for the scientific work of the Permanent Services, i.e. for analysis and the preparation and printing of publications. The other costs shall be charged to the grants from I.C.S.U.

V. — AMENDMENTS TO THE STATUTES

(21) Any amendment to the present Statutes must be proposed by the Council of the Federation and ratified by the Unions and the Executive Committee of I.C.S.U.

INTERNATIONAL ASTRONOMICAL UNION

Announcement of Changes of Officers

At the twelfth General Assembly of the Union on 3 September 1964, the following Officers were elected.

President : Professor P. SWINGS, Directeur de l'Institut d'Astrophysique, Université de Liège, Cointe-Selessin (Liège), Belgium.

General Secretary : Dr. J.-C. PECKER, Directeur de l'Observatoire de Nice, Le Mont-Gros, Nice, France.

Assistant General Secretary : Dr. L. PEREK, Astronomical Institute, Czechoslovak Academy of Sciences, Budecska 6, Prague 2, Vinohrady, Czechoslovakia.

The *Executive Committee* consists of the above officers together with the following six Vice-Presidents :

W. N. CHRISTIANSEN (Australia)	G. HARO (Mexico)
W. FRICKE (Germany, D.B.R.)	M. SCHWARZSCHILD (U. S. A.)
Y. HAGIHARA (Japan)	A. B. SEVERNY (U. S. S. R.).

The retiring President (V. A. AMBARTSUMIAN) and the retiring General Secretary (D. H. SADLER) are additional members in an advisory capacity.

ADDRESSES FOR CORRESPONDENCE

The Administrative Office (Assistant Secretary, Miss D. A. BELL) will be moved from Herstmonceux to Nice about 31 October 1964.

All correspondence for the General Secretary should be addressed to him at Nice : Le Secrétaire Général, Union Astronomique Internationale, Observatoire de Nice, Le Mont-Gros, Nice, France.

Correspondence for the Assistant Secretary should be addressed to Herstmonceux up to 29 October 1964, and thereafter to Nice : Up to 20 October 1964 : International Astronomical Union, Royal Greenwich Observatory, Herstmonceux Castle, Hailsham, Sussex, England.

After 20 October 1964 : Union Astronomique Internationale, Observatoire de Nice, Le Mont-Gros, Nice, France.

INTERNATIONAL UNION
OF THE HISTORY
AND PHILOSOPHY OF SCIENCE

XI International Congress of the History of Science

The International Union of the History and Philosophy of Science and the International Academy of Sciences are organizing the XIth International Congress of the History of Science, which will take place in Warsaw and Cracow on August 24-31, 1965. Besides the meetings in sections and various symposia, a special two-day Symposium on the role of the history of development of science for present planning of scientific research is scheduled in Cracow, August 30 and 31, 1965.

More details may be obtained from the Secretary, XIth International Congress of the History of Science, The Institute of History of Science and Technology, at the Polish Academy of Sciences, Warszawa 1, Nowy Świat 72, Poland.

FÉDÉRATION INTERNATIONALE D'ASTRONAUTIQUE

XV^e Congrès International d'Astronautique

Le XV^e Congrès International d'Astronautique s'est déroulé à Varsovie du 7 au 12 septembre 1964. Le Prof. Dr. J. Groszkowski, Président du Comité National Polonais de l'U.R.S.I., qui avait accepté de représenter notre Union à ce Congrès, a prononcé l'allocution suivante au cours de la séance plénière de clôture du Congrès :

« Parmi les problèmes envisagés par la science et la technique moderne, les problèmes liés à l'astronautique se distinguent par leur caractère complexe et compliqué. En particulier, les véhicules spatiaux nécessitent un développement des méthodes électroniques et des études de la propagation des ondes radioélectriques dans les conditions nouvelles. D'autre part, les véhicules spatiaux rendent possible des expériences radioélectriques particulièrement intéressantes et importantes pour la physique des phénomènes solaires-terrestres.

Les travaux de la Fédération Internationale d'Astronautique retiennent l'attention de l'Union Radioscientifique Internationale (U.R.S.I.). Tous les membres de notre Union ont été informés des détails du programme du quinzième Congrès d'Astronautique. L'U.R.S.I. porte un grand intérêt à la coopération scientifique internationale dans le domaine des sciences spatiales. Elle participe très activement dans les travaux du C.O.S.P.A.R. Par exemple, l'U.R.S.I. a joué un rôle actif dans l'organisation du Symposium du C.O.S.P.A.R. à Florence en 1964 ; la Commission IV de l'U.R.S.I. a préparé la partie du programme concernant la magnétosphère.

Ces travaux, ainsi que l'exploration intensive de la région interplanétaire ont démontré nettement l'importance particulière de la collaboration étroite entre diverses organisations scientifiques

intéressées. L'Assemblée Générale de l'U.R.S.I. à Tokyo en 1963 a adopté une résolution concernant le développement des études des phénomènes solaires-terrestres, qui prévoit conjointement avec d'autres organismes internationaux l'organisation en 1966 d'un symposium scientifique sur les phénomènes solaires-terrestres.

Le quinzième Congrès International d'Astronautique a nettement démontré l'important progrès réalisé dans ce domaine de la science.

Au nom de l'U.R.S.I. je tiens à vous souhaiter les meilleurs résultats de vos efforts dans l'avenir et je crois que le développement de la collaboration entre nos organisations accélérera le progrès de la science.»

U. N. E. S. C. O.

Enseignement et formation techniques et professionnels

L'U.N.E.S.C.O. et le Bureau International du Travail ont tous deux élaboré des recommandations concernant l'enseignement technique et la formation professionnelle. Celles-ci ont d'abord été publiées séparément, de la manière prescrite par les règlements propres à chacune de ces deux Organisations.

Afin de démontrer l'unité des buts et des idées dont s'inspire le travail des deux Organisations, et pour illustrer les différentes conceptions des problèmes de l'enseignement technique et de la formation professionnelle, il a été décidé de publier conjointement ces deux recommandations.

Bien que les recommandations soient adressées aux planificateurs et administrateurs responsables dans les ministères ou les administrations locales, l'Unesco estime désirable que cette publication ait la plus large diffusion possible dans tous les milieux ayant un intérêt direct ou indirect dans l'enseignement technique et la formation professionnelle.

Les deux recommandations ont pour but de fournir un ensemble de normes coordonnées dont l'U.N.E.S.C.O. et l'O.I.T. pourront s'inspirer dans leur travail ainsi que pour le développement de leurs programmes d'enseignement technique et de formation professionnelle. Le fait que ces textes constituent un ensemble de normes coordonnées n'implique nullement qu'ils règlent tous les détails d'application des principes énoncés. Ces recommandations s'adressent à tous les Etats Membres, depuis ceux qui sont industriellement les plus développés jusqu'à ceux qui commencent seulement à établir des industries, elles sont nécessairement rédigées en termes très généraux. Malgré cela, elles fournissent ample matière à consi-

dération et, bien qu'elles ne prétendent servir de modèle à un système particulier d'enseignement technique et de formation professionnelle, elles donnent un aperçu de connaissances acquises au cours d'une pratique de plusieurs années.

Des exemplaires de cette brochure peuvent être obtenus au Secrétariat Général de l'U.R.S.I.

Technical and Vocational Education and Training

Both U.N.E.S.C.O. and the International Labour Organization (I.L.O.) have made recommendations concerning technical education and vocational training. These have first been published separately in the form and manner prescribed by the respective regulations of the two organizations.

In order to show the unity of aims and assumptions underlying the work of the two organizations and to illustrate the variety of approaches to the problems of technical education and vocational training, it has been decided to issue this joint publication of the two recommendations.

While the recommendations are addressed to the planners and responsible administrators in ministries or provincial authorities, U.N.E.S.C.O. hopes that the book will reach all those who have some interest, directly or indirectly in technical and vocational education and training.

The two recommendations are meant to provide a body of doctrine to guide U.N.E.S.C.O. and I.L.O. in their work and a code of practice for Member States when changing their systems of technical education and vocational training. In saying that they constitute a doctrine no claim is made that these texts deal comprehensively with all the aspects involved. Since these recommendations are addressed to Member States ranging from the most highly industrialized to those which are only just beginning to establish industries, they are of necessity written in very general terms. In spite of this great generality they contain ample matter for consideration and while they cannot determine the pattern of a particular system of technical education and vocational training they provide a background of knowledge based on years of practical experience.

Copies of the booklet are available at the U.R.S.I. General Secretariat.

Liste des documents et des publications de l'U.N.E.S.C.O.

(1^{er} janvier — 31 mars 1964)

(Extrait)

Renseignements généraux

Cette liste, publiée également en anglais, comprend deux parties, la première énumère :

1. les documents de la Conférence générale,
les documents du Conseil exécutif,
les documents du Secrétariat.
2. les périodiques de l'U.N.E.S.C.O.,
les publications non périodiques de l'U.N.E.S.C.O.,
3. les publications parues chez d'autres éditeurs :
 - I. traductions d'ouvrages déjà publiés par l'U.N.E.S.C.O.,
 - II. ouvrages publiés pour l'U.N.E.S.C.O.,
 - III. ouvrages publiés avec l'aide de l'U.N.E.S.C.O.

La deuxième partie est un index alphabétique unique par auteurs et par sujets des documents et des publications énumérés dans la première partie.

Un index cumulatif paraît dans la liste du dernier trimestre.

Les publications des catégories A et B peuvent être obtenues en s'adressant aux agents généraux de l'U.N.E.S.C.O. dans chaque pays ou, à défaut, directement à la Division de la distribution, U.N.E.S.C.O., place de Fontenoy, Paris 7^e.

L'U.N.E.S.C.O. est seule chargée de la distribution des publications de la catégorie C.

En ce qui concerne les publications parues chez d'autres éditeurs, sauf accord préalable, les commandes doivent être adressées non pas à l'U.N.E.S.C.O., mais aux libraires.

Abréviations des langues

Ar. — Arabe	Esp. — Espagnol
Engl. — anglais	Fr. — Français
	Rus. — Russe.

PREMIERE PARTIE

Liste des documents et des publications
parues entre le 1^{er} janvier et le 31 mars 1964

DOCUMENTS

SECRETARIAT.

1782. *CL/1696. Accord pour l'importation d'objets de caractère éducatif, scientifique ou culturel (Liste des Etats signataires), 6 fév. 1964 (5 p., annexes incl.), Eng., Esp.
1783. *CL/1697. Convention concernant les échanges internationaux de publications (1958) et Convention concernant les échanges entre Etats de publications officielles et documents gouvernementaux (1958) (Ratification par le Ghana), 27 jan. 1964, 1 p., Eng. Esp.
1793. *CL/1707. Suggestions sur les mesures que pourraient prendre les Etats membres pour promouvoir la libre circulation de l'information. (Annexe : Communications de l'Inde et du Royaume-Uni), 7 avr. 1964 (6 p., annexe incl.), Eng. Esp.
1804. DG/1964/1. Allocution de M. René Maheu, directeur général de l'U.N.E.S.C.O. à l'ouverture de la première réunion de la Conférence des ministres de l'éducation des pays africains participant au Plan d'Addis-Abéba, Abidjan, 17 mars 1964. 12 p., Eng., Esp.
1809. *Bibliography of scientific publications of South and South-East Asia*. Vol. 9, n° 12, Déc. 1963 ; Vol. 10, n° 1-3, Jan.-March 1964. New-Delhi, I.N.S.D.O.C., National Physical Laboratory.
Prép. conjointement par les centres scientifiques de l'U.N.E.S.C.O. pour l'Asie du sud et du sud-est.
1811. *Chronique de l'U. N. E. S. C. O.* Vol. X, n° 3, mars 1964. La science et la technologie à l'U.N.E.S.C.O. Paris. p. 83/121. Cat. B. Ab. an. : \$ 1.75 ; 10/6 (stg) ; 5.00 F.F. Le n° : \$ 0.20 ; 1/- (stg.) ; 0.50 F. Ar., Eng., Esp.
1814. *Impact. Science et société*. Vol. XIII, n° 4, 1963. Les conséquences économiques et sociales de la construction du Haut-Barrage d'Assouan. Quelques problèmes des pays en voie de développement. L'enseignement des sciences et l'amélioration des conditions de vie. La responsabilité des savants envers la société. Paris, 1964, p. 257-325, ill., Cat. A. Ab. an. : \$ 1.75 ; 9/6 (stg) ; 4.50 F.F. ; Le n° : \$ 0.50 ; 2/6 (stg) ; 1.25 F. F. Ar., Eng.

(*) Distribution limitée.

1815. *Index translationum*. Répertoire international des traductions — International bibliography of translations. Vol. 15, 1962. Paris, 1964. 758 p., Cat. A. : \$ 20.50 ; 3 5.2/6 (stg) ; 71.75 F.F., *idem*. Rel. toile. Cat. A : \$ 22.50 ; 4 5.2/6 (stg) ; 71.75 F.F.
Idem. Rel. toile. Cat. A : \$ 22.50, £ 5.12/6 (stg) ; 78.75 F.F.
1818. *Liste des documents et des publications de l'U.N.E.S.C.O.* 1^{er} oct.-31 déc. 1963. Paris, 1964. 42 p. Cat. C. (ARC/List/8). Index cumulatif pour 1963 incl., Eng.
1834. Directeur général (René Maheu). *Rapport du Directeur général sur les activités de l'Organisation en 1963*. Paris, 1964. XI, 167 p., Cat. B \$ 4.00 ; 20/- (stg) ; 14,00 F.F. Eng., Esp., Rus.
1836. *Symposium on Standards for Stellar Photometry and Special Classification*, March 30-Apr. 2, 1963. *Proceedings* ed. by Pik-Sin The Bandung, Institute of Technology, Department of Science, 1963. 82 p. fig. (Repr. from Bandung Institute of Technology. Proceedings, special issue, 1963).
En tête du titre : Bandung Institute of Technology. Contributions from the Bosscha Observatory.
Symposium organisé sous les auspices du Centre de coopération scientifique de l'Asie du sud-est.

RÉIMPRESSIONS, NOUVELLES ÉDITIONS

1839. *Manuel de l'U.N.E.S.C.O. pour l'enseignement des sciences*. Nouvelle éd. revue et augmentée. Paris, 1964. 305 p., fig., ill., Cat. A., \$ 3.00 ; 15/- (stg) ; 10,50 F.F.
Idem. Rel. Toile. \$ 4.00 ; 20/- (stg) ; 14,00 F.F.

OUVRAGES PUBLIÉS CHEZ D'AUTRES ÉDITEURS

Les demandes pour ces ouvrages doivent être adressées à l'éditeur et non pas à l'U.N.E.S.C.O.

Traductions d'ouvrages déjà publiés par l'U.N.E.S.C.O.

1841. AUGER, Pierre. *Tendances actuelles de la recherche scientifique*. (Moscou, Commission nationale pour l'U.N.E.S.C.O., 1963). Ed. en Russie.
1842. *Manuel de l'U.N.E.S.C.O. pour l'enseignement des sciences* (Séoul, Commission nationale pour l'U.N.E.S.C.O., 1963), Ed. en Corée.
1882. *Union radio scientifique internationale — International Scientific Radio Union*. Information bull. — *Bull. d'information*, n° 136-141, 1963. Bruxelles, U.R.S.I. 6 fasc. fig., ill. Titre et têtes de chapitres : Eng. et Fr. Texte : Eng. ou Fr.

List of U.N.E.S.C.O. documents and publications

(1 January — 31 March 1964)

(Abstract)

General information

This list, issued also in French, consists of two parts :

Part I lists,

- (1) the documents of the General Conference,
the documents of the Executive Board,
the documents of the Secretariat ;
- (2) the U.N.E.S.C.O. periodicals,
the U.N.E.S.C.O. non-periodical publications ;
- (3) the publications issued by other publishers :
 - I. translations of U.N.E.S.C.O. publications,
 - II. works published for U.N.E.S.C.O.,
 - III. works published with the assistance of U.N.E.S.C.O.

Part II is a combined alphabetical subject-author index to the documents and publications listed in Part I.

A cumulative index is contained in the list for the last quarter.

Publications of categories A and B may be purchased through U.N.E.S.C.O. National Distributors or, where these do not exist, direct from the U.N.E.S.C.O. Sales and Distribution Division, Place de Fontenoy, Paris VII.

Publications of category C are distributed solely by U.N.E.S.C.O.

With regard to publications issued by other publishers, in the absence of any previous agreement to the contrary, orders should be placed through the book trade and not addressed to U.N.E.S.C.O.

General Abbreviations

Ar. — Arabic

Fr. — French

Eng. — English

Rus — Russian

Esp. — Spanish

**List of Documents and Publications issued
from 1 January to 31 March 1964**

DOCUMENTS

SECRETARIAT.

1807. **CL/1695*. Opening date of the thirteenth session of the General Conference. 3 Jan. 1964. 2 p., Esp., Fr., Rus.
1819. **CL/1707*. Suggestions to Member States on measures to promote the free flow of information (Annex : Replies from India and the United Kingdom). 7 Apr. 1964. (6 p., annex incl.), Esp., Fr.
1822. **CL/1710*. Draft Programme and Budget for 1965-1966 (document 13 C/5). 25 Mar. 1964. 1 p. Esp., Fr., Rus.
1830. *DG/1964/1*. Address by Mr. René Maheu; Director-General of U.N.E.S.C.O., at the opening of the first session of the Conference of Ministers of Education of the African Countries Participating in the Implementation of the Addis Ababa Plan, Abidjan, 17 Mar. 1964. s. d. 10 p., Esp., Fr.
1832. *NB/187*. Report of the Meeting of Working Party, No. 3 on « Scientific Translation and Terminology », Rome, 27 January-1 February 1964. 5 Feb. 1964. 8 p., annex incl. Fr.

PERIODICALS

1836. *Bibliography, documentation, terminology*, Vol. IV, Nos. 1, 2, Jan., Mar. 1964. Paris. Cat. C., Esp., Fr., Rus.
1837. *Bibliography of scientific publications of South and South East Asia*, Vol. 9, No. 12, Dec. 1963; Vol. 10, Nos. 1-3, Jan.-Mar. 1964. New Delhi, I.N.S.D.O.C., National Physical Laboratory.
Comp. Jointly by U.N.E.S.C.O. Science Cooperation Offices for South and South East Asia.
1841. *Impact of science on society*. Vol. XIII, No. 4, 1964. The social and economic consequences of the High Aswan Dam. Some problems relating to developing countries. Teaching science as a way of life for better living. The scientist's responsibility towards society. Paris, 1964., p. 249-310. Ill. An. Subscr. : \$ 1.75; 9/6 (stg); 4.50 F.F. Per copy : \$ 0.50; 2/6 (stg); 1.25 F.F. Ar., Fr.
1842. *Index translationum*. Répertoire international des traductions — International bibliography of translations. Vol. 15, 1962. Paris 1964. 758 p., Cat. A., \$ 20.50; £ 5/2/6 (stg); 71.75 F.F.
Idem. Cloth binding. Cat. A. \$ 22.50; £ 5/12/6 (stg); 78.75 F.F.
Chapter headings : Eng., Fr.

* Distribution limited.

1846. *List of U.N.E.S.C.O. documents and publications*. 1 Oct.-31 Dec. 1963. 42 p., Paris, 1964 (ARC/List/8), Cat. C. Cumulative index for 1963 incl. Fr.
1848. *U.N.E.S.C.O. Chronicle*. Vol. X, No. 3, Mar. 1964. Science and technology in U.N.E.S.C.O. Paris, p. 77-117. Cat. B. An. subscr. : \$ 1.75 ; 10/6 (stg) ; 5.00 F.F. Per copy : \$ 0.20 ; 1/- (stg) ; 0.50 F.F. Ar., Esp., Fr.
1849. *U.N.E.S.C.O. Courier*. Feb. 1964. Lasers. 100 million messages on a beam of light, Paris, 34 p., ill.
1854. *Draft programme and budget for 1965-1966*. Paris, 1964 (ca. 575 p.), fig. (13 C/5). Cat. C., Esp., Fr., Rus.
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Requests for publications in this category should be addressed to the publisher *and not* to U.N.E.S.C.O.

I. — *Translations of U.N.E.S.C.O. publications*

1872. AUGER, Pierre. *Current trends in scientific research* (Moscow, National Commission for U.N.E.S.C.O., 1963). Ed. in Rus.
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Commission Electrotechnique Internationale

Publication 170 : Wattheuremètres à courant alternatif de classe 1,0.

Prix : Fr. S. 12.—

Publication 159 : Dimensions des éléments d'accouplement des connecteurs pour fréquences radioélectriques.

Prix : Fr. S. 12.—

Publication 181 : *Première édition*. — Inventaire d'appareils électriques de mesure utilisés en relation avec les rayonnements ionisants.

Cette publication constitue un inventaire d'appareils réalisés couramment dans l'industrie ou susceptibles de l'être dans un proche avenir. D'une façon générale, les appareils mentionnés dans cette recommandation ne comprennent pas les appareils terminaux fournissant l'information, si ces derniers ne font pas partie intégrante de l'appareil.

Le but de cette recommandation est de faciliter l'étude d'un certain nombre d'appareils électriques de mesure liés aux rayonnements ionisants en donnant pour chacun d'eux une dénomination et une définition permettant de les identifier sans ambiguïté. Elle n'a pas la prétention d'être complète et sa mise à jour sera entreprise dès que possible.

Exceptionnellement dans le domaine du contrôle, de la commande et de la sécurité des réacteurs nucléaires, cette recommandation définit également certains appareils n'appartenant pas à la catégorie des appareils électriques de mesure, étant donné la nécessité de considérer l'instrumentation d'un réacteur nucléaire comme un tout.

Cette publication est bilingue, les termes et les définitions sont donnés en français et en anglais. Elle comprend les chapitres suivants : Généralités, Appareils de base pour la mesure des rayonnements ; Appareils spécialisés pour le contrôle, la commande et la sécurité des réacteurs nucléaires ; Appareils spécialisés pour la radioprotection ; Appareils spécialisés pour la prospection et l'industrie minière ; Appareils utilisant, pour la mesure, une source de rayonnement ionisant.

Prix : Fr. S. 20.—

Ces publications sont en vente au Bureau Central de la C.E.I., 1, rue de Varembe, Genève, Suisse.

Union Internationale des Télécommunications

L'U.I.T. vient de publier le Volume VI des Documents du Comité Consultatif International des Radiocommunications (C.C.I.R.), préparé à la suite de la X^e Assemblée plénière de cet organisme (Genève, 1963).

Ce volume, contenant les Résolutions et Vœux de caractère général, la liste des participants, les Rapports du Directeur, de la Commission des finances, de la Commission *ad hoc* sur la Coopération technique et de la Commission d'organisation, la liste des documents (présentée par ordre numérique), et les listes complètes des Avis, Rapports, Résolutions, Vœux, Questions et Programmes d'études du C.C.I.R., a été publié en deux langues (française et anglaise). Le prix de vente d'un exemplaire d'environ 180 pages a été fixé à 14,70 *francs suisses* ; ce prix comprend l'emballage et les frais de port pour l'envoi par la poste ordinaire dans le monde entier.

La liste complète des publications de l'U.I.T., donnant tous les renseignements utiles quant à la disponibilité, le prix et les conditions de vente des ouvrages de l'U.I.T., sera envoyée, gratuitement, sur demande adressée à la Section des ventes de l'Union internationale des télécommunications, Place des Nations, Genève, Suisse.

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International Electrotechnical Commission

Publication 170. — Class 1.0 alternating current watt-hour meters.

Price : Sw. Fr. 12.—

Publication 159. — Dimensions of the mating parts of radiofrequency connectors.

Price : Sw. Fr. 12.—

Publication 181 : First edition. — Index of electrical measuring apparatus used in connection with ionizing radiation.

This Publication forms an index of measuring instruments currently manufactured by industry or likely to be so in the near future. As a general rule, the instruments mentioned in this Recommendation do not include the terminal apparatus which supplies the information unless it forms an integral part of the apparatus.

The object of this Recommendation is to facilitate consideration of a certain number of electrical measuring instruments used in connection with ionizing radiation by giving to each of them a designation and a definition permitting their unambiguous identification. It does not pretend to be complete and additions will be made to this list later.

As an exception, in the field of control and safety of nuclear reactors, this Recommendation also defines certain apparatus which do not belong to the category of electrical measuring instruments in view of the necessity of considering nuclear reactor instrumentation as a whole.

This Publication is bilingual, terms and definitions are given in English and French. It is divided into the following main sections : General ; Basic radiation measuring apparatus ; Special apparatus for the control and the safety of nuclear reactors ; Special apparatus for health physics ; Special apparatus for the prospection and for the mining industry ; Apparatus using, for the measurement, an ionizing radiation source.

Price : Sw. Fr. 20.—

These publications are on sale at the Central Office of the I.E.C., 1, rue de Varembe, Geneva, Switzerland.

International Telecommunication Union

The I.T.U. has just published Volume VI of the Documents of the International Radio Consultative Committee (C.C.I.R.) published further to the Xth Plenary Assembly of the C.C.I.R. (Geneva, 1963).

This volume, which contains the Resolutions and Opinions of a general nature, List of Participants, Reports of the Director, the Finance Committee, the *ad hoc* Committee on Technical Cooperation and the Organization Committee, List of documents in numerical order, complete lists of C.C.I.R. Recommendations, Reports, Resolutions, Opinions, Questions and Study Programmes, has been published in English and French. The cost of one copy (about 180 pages) has been fixed at 14.70 *Swiss francs*, including packing and postage by ordinary mail to any address in the world.

A complete list of I.T.U. publications, with all information concerning availability, prices and sale conditions, will be sent free of charge upon request to the Sales Section of the International Telecommunication Union, Place des Nations, Geneva, Switzerland.
