

U. R. S. I.

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MEMORIAL NOTICE

Prof. G. D. Müller-Hillebrand

The recently deceased Professor Georg Dietrich Müller-Hillebrand was born at Dienze, Lothringen, on 17th February, 1902. He was graduated as Diplomingenieur at Darmstadt in 1925, acquired a doctor's degree in engineering in Berlin in 1931 and a Licenciate in Philosophy degree at Uppsala in 1954. In 1956 he was appointed professor at Uppsala in electricity, with special regard to atmospherical discharge (the B. John F. and Svea Andersson chair). In this office Müller-Hillebrand became head of the Institute for High Tension Research at Husbyborg. As a member of the Royal Swedish Academy of Engineering Sciences (I.V.A.) he was one of its representatives in the Swedish National Committee for Radio Sciences, holding the presidency of this Committee's Section IV, which deals with questions about the magnetosphere, and, in a sub-section, with radio interferences of terrestrial origin. In the mother union, the International Scientific Radio Union (U.R.S.I.), he was a member of the Commission IV (magnetosphere). He participated as a Swedish representative in many of U.R.S.I.'s general assemblies, most recently in Tokyo in the autumn of 1963. In the Swedish report presented by Müller-Hillebrand concerning contribution to the work pursued in Commission IV, his own work on flash meters and changes in the electric field within the 10-kc/s range should be specially mentioned. He has written a great many articles about lightning damages, lightning protectors for buildings, for telephone equipment, etc. Naturally he was also a member of the Commission on Lightning and Atmospheric Electricity of I.V.A.

Müller-Hillebrand was in possession of an exceptional expert knowledge within his field, to which he devoted a keen interest. In consequence of his decease Sweden has lost an excellent scientist within the important field of atmospheric electrical phenomena.

XVth GENERAL ASSEMBLY 1966 GENERAL SYMPOSIUM ON SOLAR-TERRESTRIAL PHYSICS

Letter from the Chairmen of Commissions III and IV

The following letter has been circulated to Official Members of Commissions III and IV.

This letter concerns the programme for the 1966 General Assembly of U.R.S.I. which is to be held in Munich. It has also been decided that there should be a symposium on solar-terrestrial relationships held in Belgrade immediately prior to the General Assembly in Munich and it is hoped that other international bodies will participate.

In accordance with the resolution of the Tokyo General Assembly, the Chairmen of Commissions III and IV are acting together in matters concerning the programme for the meeting of U.R.S.I. in Munich in 1966. Those two Chairmen have also been appointed to represent U.R.S.I. on an organizing committee which will determine the programme for the Belgrade symposium.

The two Chairmen wish to consult the official members of their two Commissions about the programmes for these two meetings. They suggest that the sessions at the General Assembly of U.R.S.I. should be devoted specifically to discussion of the propagation of radio waves used operationally. Accordingly, they propose that sessions should include (1) ionospheric absorption at vertical and oblique incidence (Commission III); (2) VLF and ELF waves (Commission III, possibly joint with Commission IV); (3) radio noise of terrestrial origin (Sub-Commission of Commission IV).

They suggest that topics concerned with the physics of the media in which waves are propagated should be included in the symposium on solar-terrestrial relationships. By 1966, a highly significant and topical aspect of solar-terrestrial relationships

will almost certainly be the interaction between the solar wind and the earth's magnetosphere. It is therefore suggested that all concerned with experimental and theoretical work in this aspect of solar-terrestrial relationships should aim at bringing their work in the next two years to a focus at the Belgrade symposium.

It is also suggested that the joint organizing committee for that symposium should be asked to include the following topics in its programme :

1. The solar atmosphere and solar wind.
2. The interaction of the solar wind the magnetosphere.
3. Hydromagnetic waves and micropulsations.
4. Geomagnetism and the ionosphere.
5. Temperatures of electrons, ions and neutral particles in the ionosphere and magnetosphere.
6. Movements of the ionosphere and magnetosphere.
7. The effect of energetic particles on the *quiet* ionosphere in *non-polar* regions.
8. The D-region.

Action.

Official members of Commissions III and IV are asked to send comments on these proposals to the Chairmen of their respective Commissions before October 1st, 1964. These comments may be sent either direct, or through the Secretary General.

J. A. RATCLIFFE Esq.,

Prof. H. G. BOOKER,

Commission III
Chairman

D.S.I.R. Radio Research Station,
Ditton Park,
Slough, Bucks,
England.

Commission IV
Chairman

Philips Hall
Cornell University
Ithaca, New-York
U. S. A.

XIV^e ASSEMBLÉE GÉNÉRALE

Van der Pol Memorial Lecture

Le 11 septembre 1963, au cours de la XIV^e Assemblée Générale de l'U.R.S.I. tenue à Tokyo, une séance solennelle a été consacrée à la mémoire du Prof. Dr Balth. van der Pol. Au cours de cette réunion, la Médaille d'Or du Prof. van der Pol a été attribuée pour la première fois.

Le compte rendu de cette réunion a été publié dans un opuscule qui est envoyé gracieusement aux Membres du Bureau, aux Présidents, aux Vice-Présidents et aux Secrétaires des Comités Nationaux, des Commissions et des Comités de l'U.R.S.I.

Le contenu de l'opuscule est donné ci-après.

Des exemplaires peuvent être obtenus au Secrétariat Général de l'U.R.S.I. au prix unitaire de 50 F. B., ou \$ 1.00 ou 7 shillings (port compris).

* * *

On September 11th, 1963, during the XIVth General Assembly of U.R.S.I. held in Tokyo, a solemn session was devoted to the memory of Prof. Dr. Balth. van der Pol. During the meeting the van der Pol Gold Medal was granted for the first time.

The report of the session has been published in a booklet which is distributed to the Members of the Board, the Presidents and Secretaries of National Committees, the Chairmen, Vice-Chairmen and Secretaries of U.R.S.I. Commissions and Committees.

The contents of the booklet follows.

Copies are available at the Secretary General's Office at the price of B. F. 50, \$ 1.00 or 7 shillings per copy (postage included).

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— Introduction.

— Opening adress, Dr. R. L. SMITH-ROSE.

- Balth. van der Pol, Prof. Ch. MANNEBACK.
 - Presentation of the Gold Medal to Prof. M. RYLE.
 - Introduction of Prof. M. RYLE.
 - Giant Radio Telescopes, Prof. M. RYLE.
 - Presentation of the Gold Medal to Eng. E. HERBAYS.
 - Quelques mots sur l'U. R. S. I., E. HERBAYS.
 - A few words on U.R.S.I., E. HERBAYS.
-

Compte Rendu du Comité National Français

Le Comité National Français a publié dans l'*Onde Electrique*, n° 444, Mars 1964, un compte rendu de la XIV^e Assemblée Générale de l'U.R.S.I. comprenant les parties ci-après :

- Assemblée Générale de l'Union Radio Scientifique Internationale, E. VASSY, Président du Comité National Français.
- Mesures et Etalons Radioélectriques, R. WERTHEIMER, Secrétaire de la Commission I.
- Radioélectricité et troposphère, P. MISME, Secrétaire de la Commission II.
- Ionosphère, D. LÉPÉCHINSKY, Secrétaire de la Commission III.
- Perturbations radioélectriques d'origine terrestre, R. RIVAULT, Vice-Président de la Commission IV.
- Guidage des Ondes, F. DU CASTEL, Secrétaire de la Commission IV.
- Radioastronomie, J. L. STEINBERG, Secrétaire de la Commission V.
- Ondes et Oscillations, E. MOURIER, C. BERGE, A. BLAQUIÈRE, M. BOUX, J. LOCHARD.
- Radioélectronique, M. Y. BERNARD, Secrétaire de la Commission VII.
- Recherche Spatiale, P. Thué, Secrétaire adjoint du Comité National Français.

- L'U.R.S.I. et les Années Internationales du Soleil Calme, G. PILLET et F. DU CASTEL.
 - Visites de Laboratoires japonais organisées à l'occasion de la XIV^e Assemblée Générale de l'U.R.S.I., M. THUÉ.
-

U. S. National Committee Report

The National Bureau of Standards in cooperation with the U. S. National Committee of U.R.S.I. devoted a special issue of *Radio Science* (Vol. 68 D, No. 5, May 1964) to U. S. reports submitted to the XIVth General Assembly of U.R.S.I.

This issue contains the following :

COMMISSION I. — *Radio Measurements and Standards.*

1. Atomic frequency and time interval standards. R. C. MOCKLER
2. RF and microwave power measurements. G. F. ENGEN and N. T. LARSEN.
3. Standards and measurements of attenuation. Impedance and phase shift. R. W. BEATTY.
4. PULSED and CW sinusoidal voltage and current measurements. M. C. SELBY.
5. Radio noise measurement methods and standards. W. W. MUMFORD.
6. Measurements at millimetre and submillimetre wavelengths. R. G. FELLERS.
7. Precise measurements of distance and of velocity of light using lasers. P. L. BENDER.

Appendix : Measurements standards and calibration laboratories in the United States. C. E. WHITE.

COMMISSION 2. — *Tropospheric Radio Propagation.*

1. Models of the troposphere.
2. Radioclimatology.
3. Radar meteorology and cloud physics.

4. Tropospheric propagation affecting space communications.
5. Influence of irregularities of terrain and of vegetation on radio wave propagation.
6. Guided waves in the troposphere.
7. Radar studies of the sun, moon and planets.

COMMISSION 3. — *Ionospheric Radio.*

1. Ionizing radiation and constitution of the ionosphere T. E. VAN ZANDT.
2. Geomagnetism and the ionosphere. S. A. BOWHILL.
3. Ionospheric storms. S. MATSUSHITA.
4. Radio, the ionosphere, and I.Q.S.Y. R. W. KNECHT.
5. The guided propagation of ELF and VLF radio waves between the earth and the ionosphere. D. D. CROMBIE and A. G. JEAN.
6. Electron distribution in the ionosphere. J. W. WRIGHT.
7. Some miscellaneous topics.

COMMISSION 4. — *Magnetospheric Radio.*

1. Constitution of the atmosphere at magnetospheric levels. S. J. BAUER.
2. Theory of magnetospheric radio scattering. H. G. BOOKER.
3. Terrestrial radio noise. W. Q. CRICHLow and R. T. DISNEY.
4. Geomagnetism and the magnetosphere. A. J. DESSLER.
5. Theory of radio and hydromagnetic wave propagation in the magnetosphere. H. G. BOOKER.
6. Whistlers. D. L. CARPENTER.
7. VLF and ELF noise. R. GALLET.
8. Energetic particles in the magnetosphere. J. R. WINKLER and R. L. ARNOLDY.

COMMISSION 5. — *Radio and Radar Astronomy.*

1. University of Alabama.
2. Cornell University.
3. Air Force Cambridge Research Laboratories.
4. Collins Radio Company.
5. Carnegie Institution of Washington.

6. University of Florida.
7. Harvard College Observatory, Harvard Radio Astronomy Station, Fort Davis.
8. Harvard College Observatory, Radio Astronomy and Space Radio Project.
9. Harvard College Observatory, Radio Meteor Project.
10. University of Illinois.
11. Jet Propulsion Laboratory.
12. Lincoln Observatory.
13. University of Michigan.
14. National Aeronautics and Space Agency, Goddard Space Flight Center.
15. National Bureau of Standards.
16. National Center for Atmospheric Research, High Altitude Observatory, Boulder.
17. National Radio Astronomy Observatory, Greenbank.
18. Ohio State University Radio Observatory.
19. Stanford Radio Astronomy Institute.
20. University of Texas.
21. U. S. Naval Research Laboratory, Washington.
22. Yale University.

COMMISSION 7. — *Radio Electronics.*

1. Progress in microwave power tubes. J. FEINSTEIN.
2. 1960-1963 advances in the state-of-the-art of low-noise beam-type microwave tubes. R. W. PETER.
3. Developments in semiconductor devices in the U. S. A. for the period 1960-1963. A. VAN DER ZIEL.
4. Parametric devices. R. RAFUSE.
5. Millimeter-wave techniques. A. KARP and J. ALLISON.
6. Status of gas lasers. W. R. BENNETT, Jr.
7. Noise in masers. Hermann A. HAUS.
8. Nonlinear optical properties of solids. P. S. PERSHAN.
9. Highlights of progress on satellite devices. C. C. CUTLER and J. R. PIERCE.
10. Waves in plasmas. A. BERS and P. CHORNEY.

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U. R. S. S.

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COMMISSIONS ET COMITÉS

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Mesures et Etalons Radioélectriques

BIBLIOGRAPHIE

Nous attirons l'attention sur les numéros ci-après du *Bulletin Horaire du Bureau International de l'Heure* (B.I.H.) :

- n° 1 (Série H), janv.-fév. 1963. — Heure définitive des signaux horaires et le temps atomique. Historique, définitions, méthodes du calcul, utilisation.
 - n° 5 (Série 6), Sept.-oct. 1963. — L'émission de fréquences étalon, de signaux. Coordonnées et définition de la seconde.
-

Commission III. — Ionosphère

INDICE D'ACTIVITÉ SOLAIRE POUR LA PROPAGATION IONOSPHERIQUE

(see English text p. 22)

(Extrait du *Journal des Télécommunications*, Vol. 31, nos 6 et 7, 1964)

Conformément à la Résolution 4 du 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
1963		29	30	30	29	29	27	28

● I_{F_2} (Indice ionosphérique).

Année	Mois	1	2	3	4
1964		9(2)*	2(2)*	20(2)*	14(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 les valeurs définitives de l'indice I_{F_2} .

● Φ (flux du bruit solaire moyen mensuel) :

Année	Mois	1	2	3	4
1964		74	76	75	73

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

● R_{12}

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

(**) Renseignements obligeamment fournis par le Professeur Waldmeier, Observatoire fédéral de Zurich.

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

● I_{F_2} *

Année	Mois	4	5	6	7	8	9	10
1964		1	2	1	0	-1	-1	(-1)

(***) 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} :

+35	+30	+25	+30	+20	+10	+10
-70	-80	-75	-70	-65	-85	-100

VALEURS OBSERVÉES :

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

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

● I_{F_2} (indice ionosphérique) :

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

(*) 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} .

● Φ (flux du bruit solaire moyen mensuel) :

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

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

● R_{12} .

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

(**) Renseignement obligamment fournis par le Professeur Waldmeier, Observatoire de Zurich.

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

$W I_{F_2}$ ***.

Année	Mois	5	6	7	8	9	10	11
1964		9	1	0	0	-1	-2	(-2)

(***) Renseignements obligamment 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	5	6	7	8	9	10	11
Max.	+37	+31	+25	+31	+16	+8	+8
Min.	-68	-82	-27	-72	-75	-93	-102

SOLAR INDICES FOR IONOSPHERIC PROPAGATION

(Reprint from the

Telecommunication Journal, Vol. 31, No. 6 and 7, 1964)

In accordance with Resolution No. 4 of the International Radio Consultative Committee (C.C.I.R.), the Secretariat of the body has produced the following tables, showing the basic indices of ionospheric propagation (C.C.I.R. Recommendation No. 371 and Report No. 246).

PARAMETERS :

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

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

- I_{F_2} (ionospheric index) :

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

(*) The figures in brackets represent the number of figures for foF₂ which have not yet reached the C.C.I.R. Secretariat, and have been overlooked in calculation of I_{F₂}. For further detail, see the *Telecommunication Journal*, April 1964, page 119.

With regard to the data contained in C.C.I.R. Report No. 246 two ionospheric sounding stations have ceased to operate — Puerto Rico (in June 1963) and Fairbanks (in November 1963). The values of I_{F₂} that include the figure (2) in brackets are therefore the definitive values for I_{F₂}.

- $\bar{\Phi}$ (mean monthly solar noise flux) :

Year	Month	1	2	3	4
1964		74	76	75	73

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

● R_{12} .

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

(**) Data kindly supplied by Professor Waldmeier, Federal Observatory, Zurich.

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

● $I_{F_2}^{***}$.

Year	Month	4	5	6	7	8	9	10
1964		1	2	1	0	-1	-1	(-1)

(***) 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.

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

+35	+30	+25	+30	+20	+10	+10
-70	-80	-75	-70	-65	-85	-100

PARAMETERS :

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

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

● I_{F_2} (ionospheric index) :

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

(*) The figures in brackets represent the number of figures for foF₂ which have not yet reached the C.C.I.R. Secretariat, and have been overlooked in calculation of I_{F₂}. For further detail, see the *Telecommunication Journal*, April 1964, page 119.

With regard to the data contained in C.C.I.R. Report No. 246 two ionospheric sounding stations have ceased to operate — Puerto Rico (in June 1963) and Fairbanks (in November 1963). The values of I_{F₂} that include the figure (2) in brackets are therefore as from the month of November, 1963, the definitive values for I_{F₂}.

● Φ (mean monthly solar noise flux) :

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

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

● R_{12} .

Year	6	7	8	9	10	11
1964	11	10	9	8	7	6

(**) Data kindly supplied by Professor Waldmeier, Federal Observatory, Zurich.

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

● $I_{F_2}^{***}$.

Year	Month	5	6	7	8	9	10	11
1964		9	1	0	0	-1	-2	(-2)

(***) 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.

Estimate of the error (%) in I_r predictions :

Month	5	6	7	8	9	10	11
Max.	+37	+31	+25	+31	+16	+8	+8
Min.	-68	-82	-27	-72	-75	-93	-102

Commission VI on Radio Waves and Circuits

SYMPOSIUM ON ELECTROMAGNETIC WAVE THEORY

**Technological University Delft, Julianalaan 132
Delft, the Netherlands**

September 6 to 11, 1965

Sponsored by : The International Scientific Radio Union (U.R.S.I.),
Technological University Delft, the Netherlands, Netherlands
National Committee of U.R.S.I.

ORGANIZING COMMITTEE

- Dr. F. L. H. M. STUMPERS, *chairman*.
Prof. R. TIMMAN, *secretary*.
Rear admiral (ret.), H. A. W. GOOSSENS, *treasurer*.
Prof. H. M. BARLOW, *member*.
Prof. H. BREMMER, *member*.
Prof. K. M. SIEGEL, *member*.
Prof. V. I. SIFOROV, *member*.
Prof. B. D. H. TELLEGEN, *member*.

FIRST ANNOUNCEMENT

From Monday, September 6th to Saturday, September 11th
1965 a «Symposium on Electromagnetic Wave Theory» will
be held at the Technological University Delft.

The symposium will be the next one in the series, which includes : the «Symposium on Microwave Optics» Montreal, Canada in 1953, the «Symposium on Electromagnetic Wave Theory» Ann Arbor, Michigan, U. S. A. in 1955, the «Symposium on Electromagnetic Theory» Toronto, Canada in 1959, and lastly the «Symposium on Electromagnetic Theory and Antennas» Copenhagen, Denmark in 1962.

The aim of the symposium is to discuss progress in the field of electromagnetic wave theory.

Papers will be welcomed in the following sectors :

1. Propagation in inhomogenous and anisotropic media (e.g. in partially filled waveguides, in semi-conductors, ferrites and plasma).
2. Propagation in random media in the presence of statistical boundaries (or random resonators).
3. Coherence theory (per se) and its relation to communication theory and to quantum theory.
4. Space waves and underground waves for telecommunications.
5. Millimetre waves and optical waves for long-distance telecommunications by waveguide.
6. General theory of guided waves including boundary value problems and wave beams.
7. Antenna theory including diffraction and radiation properties in more general media.
8. Propagation in non-linear media.

As a rule the sessions will be opened by an invited paper, followed by a series of shorter papers.

Papers should be sent to Prof. Dr. R. Timman, Secretary of the organizing committee — Technological University Delft — Julianalaan 132, Delft, the Netherlands.

Authors are requested to submit a three page summary, containing not less than 800 and not more than 1200 words. Since these summaries form a basis for the selection of papers, authors are advised to write them most carefully. The summaries must have reached the secretary of the organizing committee before 1st March 1965.

Admitted languages are English or French.

Papers must be presented at the symposium by the author or by one of the authors.

U.R.S.I.-C.I.G. Committee

SUBCOMMITTEE ON N(h) PROFILES

A meeting of the above Subcommittee was held at the I.Q.S.Y. Secretariat, London, over the period May 21-23, 1964. The following attended :

Professor W. J. G. BEYNON (*Chairman*, U.R.S.I.-C.I.G. Committee).

Mr. J. W. WRIGHT (*Chairman*, N(h) Subcommittee).

Mr. G. M. BROWN (*Secretary*, U.R.S.I.-C.I.G. Committee).

Dr. W. BECKER.

Mr. D. ECCLES.

Dr. H. H. HOWE.

Dr. A. K. PAUL.

Dr. C. TAIEB.

Dr. J. O. THOMAS.

Dr. J. E. TITHERIDGE.

The purpose of the meeting, which was planned during the fourth meeting of the U.R.S.I.-C.I.G. Committee in Tokyo in September 1963 (see Minutes, section 4, *U.R.S.I. Information Bulletin*, No. 140, p. 27), was to explore the features of the various methods of true height analysis at present available, to compare the results of various test calculations, and to discuss the N(h) programmes for the I.Q.S.Y.

An introductory review of eight different N(h) methods was given, and their suitability for various objectives was discussed, such as the determination of F₂ peak parameters, general survey problems, topside ionogram analysis, and the « valley » problem concerning the E and lower F regions.

The purpose and nature of various test calculations undertaken by members of the Subcommittee were explained by Mr. Wright and Dr. Becker, and the results obtained led to considerable discussion. Both models and ionograms had been interchanged.

There was a general survey of the $N(h)$ programmes planned by the station networks for the I.Q.S.Y., including the topside sounder analyses, and consideration was given to the possibility of recommending a manual method for the determination of certain profile parameters.

A full report on the proceedings of the meeting will be published later. It is also planned to publish a Monograph in which the various methods of $N(h)$ analysis will be described in detail.

Geoffrey M. BROWN,
June 16, 1964

Space Radio Research Committee

REPORT OF INFORMAL MEETING

Florence, 14 May 1964

1. The following members of the Committee were present :

Professor S. SILVER (*Chairman*).
Professor W. J. G. BEYNON (*Secretary*).
Professor H. G. BOOKER.
Mr. J. CLARK.
Dr. W. DIEMINGER.
Dr. H. FRIEDMAN.
Dr. K. I. GRINGAUZ.
Dr. A. P. MITRA.
Dr. R. L. SMITH-ROSE.
Dr. J. P. VOGÉ.

2. *Symposium on « Optimization of Instrumental Design and Data Processing in Space Experiments »*. — The Chairman reported on preliminary discussions which had taken place on the Symposium

on « Optimization of Instrumental Design and Data Processing in Space Experiments » proposed at Tokyo. After some discussion the Committee agreed that this topic was suitable for the next C.O.S.P.A.R. meeting provided that suitable preparation is undertaken beforehand. Dr. A. P. Willmore (U.C.L., London) had submitted a document relevant to this topic which could be circulated in advance of the meeting.

3. *Relationship between U.R.S.I. and C.O.S.P.A.R.* — The Chairman referred to discussions which were now going on concerning the reorganisation and future of U.R.S.I. and stressed the need for U.R.S.I. playing a proper part in C.O.S.P.A.R. He emphasised that there was no wish to transfer work from one international body to another, but it was felt that the U.R.S.I. Space Radio Research Committee could play an invaluable part as an adjunct committee to the existing Working Groups of C.O.S.P.A.R. There are a number of questions considered by the Working Groups which could profitably and appropriately be dealt with by this U.R.S.I. Committee. It would seem desirable that the U.R.S.I. Space Radio Research Committee should meet during each C.O.S.P.A.R. Assembly and that relevant parts of the Space Programme should be referred to it for consideration.

Dr. Friedman supported the suggestion that this U.R.S.I. Committee could be of great assistance at C.O.S.P.A.R. Assemblies. He agreed that it could assist in determining the C.O.S.P.A.R. programme and that it could be very useful in transmitting U.R.S.I. resolutions to C.O.S.P.A.R. and feeding back the C.O.S.P.A.R. response to these.

After much discussion it was agreed that the Chairman of the Committee should discuss with the C.O.S.P.A.R. Executive Committee the manner in which the U.R.S.I. Space Radio Research Committee can be given greater responsibility for the part of the C.O.S.P.A.R. Programme which concerns the ionosphere and magnetosphere.

4. *1966 Belgrade Symposium.* — The Chairman referred to the decision taken at the Tokyo General Assembly of U.R.S.I. to hold a Symposium at Belgrade in 1966 on some topic in the solar-terrestrial physics field. It had been agreed that U.R.S.I. should invite other bodies to cooperate in this Symposium. After some

discussion it was agreed that C.O.S.P.A.R. should be asked not to hold a Symposium in this field in 1966 but to join with U.R.S.I., I.A.G.A. and I.A.U. in a single, major Symposium at Belgrade.

5. *Surface Properties of Planets.* — Dr. Voge referred to discussions which had taken place in U.R.S.I. Commission II at Tokyo on the proposal for a meeting to discuss the investigation of the surface properties of planets by radio means. It seemed possible that this subject is one which would be of interest to C.O.S.P.A.R. Dr. Friedman expressed the view that C.O.S.P.A.R. would only be concerned if the investigations were carried out from space vehicles. He felt that it would be appropriate for such a meeting to be organised by U.R.S.I. with C.O.S.P.A.R. cooperation. Such a meeting might be held near the time of the next C.O.S.P.A.R. Meeting.

W. J. G. BEYNON,
Secretary

U.R.S.I. Space Radio Research Committee

PERMANENT SERVICES

International Ursigram and World Days Service (I. U. W. D. S.)

MINUTES OF THE THIRD MEETING OF THE I.U.W.D.S. STEERING COMMITTEE,

Florence, May 13, 1964

Were present :

- A. H. SHAPLEY, *Chairman* I.U.W.D.S. Steering Committee.
- L. D. DE FEITER, *Secretary* I.U.W.D.S. Steering Committee.
- R. L. SMITH-ROSE, representative European Regional Committee.
- R. Michard, representative I.A.U.
- M. NICOLET, representative I.U.G.G.
- A. P. MITRA, representative U.R.S.I.
- Dr. KRUSHKIN, representing Miss R. A. ZEVAKINA, representative Eurasian Regional Committee.
- Dr. HIRAO, representing H. UYEDA, representative Western Pacific Regional Committee.
- O. M. ASHFORD, representative World Meteorological Organization.
- K. BOGGS, World Warning Agency, Fort Belvoir, U. S. A.

Preliminary : The plans for organising this informal meeting arose, during the first days of the C.O.S.P.A.R. General Assembly, when it was recognized that a large percentage of the Steering Committee members was in attendance of this conference. Though this meeting should be considered as an informal one, it was proposed that the minutes should be published as for the two previous meetings.

1. *Brief review and discussion of present activities.*

The chairman gave a report on the functioning of the service within the I.Q.S.Y. Programme. About this programme the following items were particularly stressed :

(a) *Publications :*

the I.Q.S.Y. Instruction Manual Nr. 1, World Days ;
the I.U.W.D.S. booklet « Synoptic Codes for Solar and Geophysical Data, 1963 » and
the abbreviated Calendar Record for the first two months of 1964, have been published.

This latter publication is the first of a series of abbreviated calendar records, giving basic solar and geomagnetic indices together with some comments and highlights day by day, which will appear in subsequent issues of *I.Q.S.Y. notes*. The compilations are done by the World Warning Agency and the I.U.W.D.S. Deputy Secretary, Miss J. V. Lincoln.

The present plan is, that the full calendar records for the period 1963-1965 will be published by the I.Q.S.Y.-Secretariat in a separate series of pamphlets, each covering one half year. Similar arrangements will be made for the years 1960-1963. It is proposed that I.U.W.D.S. will re-imburse I.Q.S.Y. for the basic costs of these publications.

(b) The alarm systems. The programme for alerts is being carried out as planned. As regards these alerts there has been almost daily contact by telegrams between the various regional warning centres and the I.Q.S.Y. World Warning Agency. The timely advice from the designated solar experts on SOLCALM is proving very helpful.

There still are some problems about the criteria for the GEO-ALERTS, in part because the level of solar activity has not been as low as in some past solar minima. The record of the GEOALERTS is published promptly in *I.Q.S.Y. notes*.

It has been brought to our attention that the scheme for selecting retrospective world intervals, as was laid down at the Rome I.Q.S.Y. Assembly, is too complicated in order to function effectively. Discussions about this problem, with the relevant I.Q.S.Y. disciplines, will be continued.

The forecasts of solar activity (SOLFORC), as recommended by the I.Q.S.Y. Committee, have been issued weekly since October, and distributed by airmail to about 150 scientists, who have confirmed their interests. These forecasts are provided, on an experimental basis, by the experts, designated by the I.Q.S.Y. Solar Activity Working Group; Dr. Michard, Dr. Dodson-Prince and Dr. Giovanelli.

There have been a few occasions to test the effectiveness of the ADALERTPRESTO TENFLARE warning system for solar flares, which is based upon 10 cm solar radio observations. The results are promising with regard to the goal to distribute these alert messages within one hour. Of course, further experience should be gathered before good evaluation of the effectiveness and dependability of the scheme can be given.

From the discussion following the presentation of this report we note the following items :

The function of the national warning contacts is : helping scientists in their country to make arrangements for communications and receiving the I.U.W.D.S. material.

The information on the green coronal line is of great importance during the solar minimum ; as a consequence the priority of this information should be increased. As noted by Dr. Nicolet, the circulation of the 10 cm-index through the I.U.W.D.S. channels has been proven to be very useful.

2. — *Plans for future.*

(a) Mitra gave a review of a proposal from C.O.S.P.A.R. Working Group III, to ask the cooperation of I.U.W.D.S. in providing tentative satellites designations. According to Boggs, the World Warning Agency could certainly manage to do so. In principle the Steering Committee agreed to provide this service. Further details about this proposal will be worked out in cooperation with C.O.S.P.A.R. Working Group III.

(b) A proposal of the I.U.W.D.S. Secretary to invite also experts from the different regional warning centres for the next Steering Committee meeting, was discussed and, mainly for financial reasons, dismissed. The reason for bringing up this proposal was, that on the meetings of the Steering Committee technical questions with regard to communications and codes can usually not be

discussed in detail, because of lack of information, which should have come from the experts of the regional warning centres. Especially with regard to the communications available to each regional warning centre, it was thought useful that these problems should be dealt with during meetings of the different Regional Committees of I.U.W.D.S. The regional representatives can bring the results to the Steering Committee meeting. The secretary was invited to take the necessary steps, in order to ensure that for the next Steering Committee meeting the representatives of the different regions, would be informed about particular details in the regions. The Regional Committees will be invited to have a meeting well in advance of the Steering Committee meeting itself. A tentative agenda for these meetings is enclosed herewith (Appendix). A request to F.A.G.S. for financial support will be drafted by the secretary.

(c) Budget requests to F.A.G.S. for 1965 and 1966 were proposed by the chairman and secretary and adopted by the Steering Committee. These budgets are annexed (Appendix 2).

(d) With regard to the post-I.Q.S.Y. plan no definite proposals were made. It was generally felt that the overall working of the service should be kept about the same, though particular details should be adapted to the rise of solar activity. Nicolet expressed the great value of the abbreviated calendar records, published with a very short delay and advised the Steering Committee that steps should be taken to have such a publication continued.

Since no other business was to be discussed, the chairman closed this short meeting at 18.45.

APPENDIX I

TENTATIVE AGENDA FOR 1965 MEETING OF STEERING COMMITTEE AND REGIONAL COMMITTEES OF I.U.W.D.S.

1. Review of present activities.

- (a) Regional operation of the service ;
- (b) Inter-regional relations and communications ;
- (c) Connections between regional committees and national warning contacts.

2. Discussion of the introduction of information from space vehicles into the service.
 - (a) What information from space vehicles will be useful for wide, rapid distribution ?
 - (b) How can this information be handled through the regional warning centers ?
3. Post I.Q.S.Y. plans.
 - (a) What changes of alerts are needed ?
 - (b) What changes in contents of interchange messages and what changes in priority of information is necessary ?
 - (c) Are communication arrangements sufficient ?
4. Suggestions for revision of the 1963 edition of the I.U.W.D.S. code booklet.
5. Annual report of activities of different regional warning centers, containing a survey of the manner of operation, time schedule, number of messages, a.s.o.
6. Description of the services available from the regional warning centers.
7. Discussion of arrangements for SPACEWARN messages.

Notes.

1. The regional activities may be affected by the addition of the three new associate regional warning centers : Stockholm, Prague and Irkutsk.
2. Please identify those observatories which are not active any more in order to gain indicators.
3. The information asked for under item 5 will be most useful to the I.U.W.D.S. secretary in drafting the annual report to F.A.G.S., and the three adhering unions, and which is published in the different *Information Bulletins*.

APPENDIX 2

BUDGET REQUESTS FROM F.A.G.S. FOR 1965 AND 1966

	1965	1966
1. Calenders	\$ 250	\$ 250
2. (a) Calender records (two booklets)	1500	1500
(b) Complete publication calender records 1960/1962	1500	—
3. New edition (1965) booklet of synoptic codes for solar and geophysical data :		
(a) preparation	750	—
(b) printing	1750	—
4. Secretarial expenses	500	500
5. Travel expenses	1000	1000
6. Distribution expenses W.W.A.	250	250
	\$ 7500	\$ 3500

Note : The total expenses expected for the publication of the complete calender records for the years 1960-1962 is \$ 3000. Of this amount \$ 1500 can be covered from the subvention for 1964.

APPENDIX 3

REPORT TO C.O.S.P.A.R. — PLENARY MEETING, MAY 20th, 1964
BY THE INTERNATIONAL URSIGRAM
AND WORLD DAYS SERVICE (I.U.W.D.S.)

It is gratifying that a gradual increase of interest from the side of C.O.S.P.A.R. in the activities of I.U.W.D.S. can be noted. This, of course, in particular holds for the transmission of launching announcements and orbital data on satellites through the SPACEWARN net-work, which is conducted for C.O.S.P.A.R. But also the other I.U.W.D.S. activities have been proven to be of use to C.O.S.P.A.R. scientists.

During the C.O.S.P.A.R. meeting it has been possible to arrange an informal, but almost complete meeting of the I.U.W.D.S. Steering Committee, during which the following items, of interest to C.O.S.P.A.R., were discussed :

1. Reaction of I.U.W.D.S. upon a possible request from C.O.S.P.A.R. to take over the tentative attribution of satellite designations. The response has been favourable.
2. Publication of abbreviated records of indices of interest to solar, geophysical and space research within a short delay (see e.g. *I.Q.S.Y. Notes*, Nr. 7, p. 21 et seq.) will be continued.
3. The effectiveness of the service and possibilities of the incorporation of suitable data from space vehicles into it will be discussed in forthcoming meetings of both the Regional Committees and the Steering Committee of I.U.W.D.S.

In addition the cooperation of C.O.S.P.A.R. WG 2 has been requested for suggestions for the specification of World Days in the forthcoming I.U.W.D.S. International Geophysical Calendar for 1966.

The I.U.W.D.S. Secretary,

L. D. DE FEITER.

APPENDIX 4

REPORT TO C.O.S.P.A.R. WORKING GROUP 2

(L. D. DE FEITER, *Correspondent for World Days and Alerts*)

My report may, most appropriately, be given as a series of footnotes to the aims of the International Ursigram and World Days Service (I.U.W.D.S.) and the means put at its disposal in order to achieve these aims. In order to remind you of these, I quote them from the constitution of I.U.W.D.S. :

« The Service aims to provide information rapidly to the world scientific communities to assist in the planning, coordination and conduct of scientific work in the relevant disciplines.

These aims will be achieved by :

- (a) the advance specification of Regular World Days, World Geophysical Intervals and other periods of geophysical interest, which will be published annually in World Geophysical Calendars.
- (b) the collection, coordination, interchange and distribution by rapid means of selected current observations and information of immediate significance to geophysical and space research, and to provide suitable interchange synoptic codes.
- (c) the specification on a current schedule, by a World Warning Agency of Solar Activity and Geophysical Alerts and, occasionally, Special World Intervals.
- (d) the preparation and publication of periodic post facto Calendar Records of significant indices and outstanding solar and geophysical events.
- (e) the undertaking of similar activities in cooperation with the participating Scientific Unions or other international scientific bodies. »

In addition it should be remarked that the I.U.W.D.S. is a permanent service of U.R.S.I., in association with I.A.U. and I.U.G.G., and adhering to the Federation of Astronomical and Geophysical Service (F.A.G.S.).

As regards aim (a), the latest Geophysical Calendar is the one for the I.Q.S.Y. (1964-1965); it was published in the *I.Q.S.Y. Instruction Manual*, No. 1. World Days and has been published in many scientific journals and otherwise given wide distribution. It has taken account of all the valuable suggestions of C.O.S.P.A.R. Working Group II made at the Rome meeting, March 1963.

Near the end of the year, the Calendar for 1966 should be issued. We would be most grateful if we could receive, well ahead of this time, any suggestions for this Calendar. In addition, we would like to receive names of persons with whom we can discuss particular space research problems (i.e. rocket weeks, etc.).

In respect to aim (b), the Service continues to be helped efficiently by a number of organizations (among them several national telecommunications services and the W.M.O. network) by providing communication links and well-trained operators.

The task of the I.U.W.D.S. Steering Committee here merely exists in providing the international arrangements and coordination. The solar-geophysical codes have now been published in a small pocket-sized booklet, which is distributed free of charge, thanks to the financial support of F.A.G.S. The activities in respect to information distribution of satellite launchings and orbital data is covered in a report to Working Group III.

The type of work outlined in (c) was started, initially, as part of the World Days programme for the I.G.Y. The criteria for selecting special observing periods has been improved since then and adopted to the decline in solar activity. The decision to start a special observing period is taken by the World Warning Agency operated by C.R.P.L. near Washington, D. C.

Three new innovations were introduced into the Programme for the I.Q.S.Y. :

1. Distribution of forecasts of solar activity, issued by the three experts : Mrs. Dodson-Prince, Dr. Michard and Dr. Giovanelli, and distributed to the institutions who applied for it, by the World Warning Agency. This was a recommendation of C.O.S.P.A.R. Working Group II.
2. Retrospective intervals for several of the disciplines. Specific details about them can be found in the Instruction Manual for World Days.
3. Prompt warning messages, when an important solar flare occurs. These warning messages are based upon 10 cm solar radio noise monitoring records. Experience, up till now obtained, has shown that it would be possible to distribute these messages with a delay of not more than one hour to a limited number of laboratories.

Additional details about the programmes of our work has been and will be published in *I.Q.S.Y. Notes* and in the *U.R.S.I. Information Bulletin*. The C.O.S.P.A.R. Secretariat is kept fully informed. The I.U.W.D.S. is continually receptive to suggestions on any aspect of this work and particularly invites comments from Working Group II.

REPORT ON WORLD DAYS PROGRAMME
FOR I. Q. S. Y. MEETING,
Florence, May 7, 1964

1. *I.Q.S.Y. Instruction Manual*, No. 1. — World Days was published by the I.Q.S.Y. office in mid 1963 and has been given very wide distribution. Supplementary information has appeared in *I.Q.S.Y. Notes*, Nos. 5, 6 and 7, including much of the substance of this report.

2. The *International Geophysical Calendar* for I.Q.S.Y. 1964-1965 was published by I.U.W.D.S. in mid 1963. Several thousand of the smaller size version, with brief explanatory text on the reverse side, have been distributed through I.U.W.D.S. and I.Q.S.Y. channels. The I.Q.S.Y. office has produced and distributed a large two-coloured wallsize version. The Calendar has been published in about a dozen technical journals which reach the attention of scientists in the I.Q.S.Y. disciplines.

3. The programme of *Alerts* is being carried out as planned. From October through April, worldwide GEOALERTS have been declared on 64 different days, distributed among the various types as follows (on some days two or more kinds of alerts were declared);

(a) Magnetic storm expected	19
(b) Magnetic storm exists	10
(c) Magnetic calm	3
(d) Solar activity	22
(e) Solar calm	4
(f) Cosmic event	1*
(g) Stratospheric warming	16

Comments on (g) are given in (7) below. As regards the other types of Alerts there has been almost daily contact by telegram between the various regional warning centers (R.W.C.) and the

(¹) The Cosmic Event alert was based on a report which subsequently proved to be premature; see *I.Q.S.Y. Notes*, No. 7.

I.Q.S.Y. World Warning Agency such that the GEOALERT declarations tend to be the consensus of informed opinion. The timely advice from the designated solar experts on SOLCALME is proving helpful. There still are problems about the criteria for the GEOALERTs, in part because the level of solar activity has not been as low as in some past solar minima. In all of the I.U.W.D.S. regions, either the R.W.C. or solar-geophysical observatories have been issuing Advance Alerts for regional distribution and R.W.C. interchange; this scheme has helped those I.Q.S.Y. stations which need alert-type information more quickly and on the basis of less stringent criteria. The record of the GEOALERTS is published promptly in *I.Q.S.Y. Notes*; a summary record of the Advance Alerts issued is being collected.

4. It is too early to select *Retrospective World Intervals* for the first months of the I.Q.S.Y. period. Nominations have been made by various individuals and groups for the 1963 selections requested by the I.Q.S.Y. Committee. These will be summarized in a separate report. Some comments have been received that the mechanism laid down at the Rome, (1963) I.Q.S.Y. Assembly is too complicated and in order to function requires spontaneous initiative on the part of quite a number of people.

5. The *current data exchange* part of the programme seems to be proceeding quite satisfactorily in accordance with the plans. The I.U.W.D.S. booklet of «Synoptic Codes for Solar and Geophysical Data 1963» was distributed beginning December 1963; a mimeograph sheet giving a few errata and a few additions has also been issued and this information will be sent to *I.Q.S.Y. Notes*. The daily interchange among R.W.C. seems to be effective and no adverse comments have come to light about distribution to requesting I.Q.S.Y. stations in the regions.

6. *Communications* arrangements for carrying out the active part of the World Days programme seem to be working quite well. National Warning Contacts have been designated by about 37 of the I.Q.S.Y. participating committees, as detailed in *I.Q.S.Y. Notes*. Coordination has been accomplished by 3 circular letters to date in addition to direct correspondence with R.W.C., the World Days Reporter or the I.Q.S.Y. Secretariat. Some of the National Warning Contacts have been particularly active in orga-

nizing the programme in their country; a notable example is Argentina, which has produced several detailed bulletins in Spanish covering the various aspects of the World Days programme. Information has been published in *I.Q.S.Y. Notes* about radio broadcasts in 5 different countries, either of the full GEOALERT message or of a symbol repeatedly broadcast indicating the main type of Alert in effect. The cooperation of the W.M.O. in the distribution of GEOALERT messages has been outstanding, including several circulars to national meteorological authorities giving details of communication routings and schedules. While there are some countries and remote stations not effectively reached by this network and some problems of dependability and speed, the meteorological channels are taking care of a very large number of I.Q.S.Y. stations and the effectiveness of the worldwide alerting scheme is due in very large measure to the availability of these communication channels.

7. The *Stratospheric Warming Alerts* (STRATWARM) were initiated during the past northern winter season. Following the outlines developed through W.M.O. channels, the details were worked out by the U. S. Weather Bureau experts charged with making the decisions on GEOALERT STRATWARM. The information on the detailed plans was available only after the World Days Manual was published and therefore had to be distributed by mimeogram through W.M.O. and I.U.W.D.S.-I.Q.S.Y. channels. Regional centres at Tokyo and especially the one at Berlin also participated in the scheme, both with advice and in the issuance of regional STRATALERTS with details of the location, intensity and movement of centres of warming. It is understood the W.M.O. is arranging for such alerts to be selected, as appropriate, for the coming southern winter season through the centre at Melbourne.

8. The *Forecasts of Solar Activity* (SOLFORC) have been issued weekly since October, as recommended by the I.Q.S.Y. Committee, and distributed by airmail to about 150 scientists who have confirmed their interest. The forecasts are contributed by the experts designated by the I.Q.S.Y. Solar Activity Working Group, Drs. Michard, Dodson-Prince and Giovanelli. The practical aspects of the work are handled by the World Warning Agency and the

Boulder office of the I.U.W.D.S. Deputy Secretary. The forecasts are admittedly an experiment and the interest in them from the I.Q.S.Y. scientific community has been unexpectedly enthusiastic.

9. An *Abbreviated Calendar Record*, giving basic solar and geomagnetic indices together with some comments and highlights day by day, was published in *I.Q.S.Y. Notes* (No. 7) for January and February 1964. The compilation were done by the World Warning Agency and the I.U.W.D.S. Deputy Secretary, Miss J. V. Lincoln, within three weeks after the end of the period covered. Publication on this prompt schedule will be continued in subsequent *I.Q.S.Y. Notes* if the usefulness of the Records is confirmed.

10. The full *Calendar Record* for the first half of 1963 has been completed and is awaiting final editorial attention. The present plan is for publication of the full Calendar Records for 1963-1965 by the I.Q.S.Y. Secretariat in a separate series of pamphlets each covering one half year. Arrangements are under way for I.U.W.D.S. to reimburse I.Q.S.Y. for the basic costs of publication at least of the 1963 material.

11. Plans have been completed by the I.U.W.D.S. Secretary for the very *fast warnings of solar flares*, called ADALERTPRESTO TENFLARE. These are provided by any one of three cooperating 10 cm solar radio observing stations to a very limited number of investigators who have requested to receive them either directly or through R.W.C. The goal is to distribute the Alert within one hour. There have been about two occasions thus far when the flare-event criteria have been met and promptly recognized through an alarm device, but evaluation of the effectiveness and dependability of the scheme will have to await further experience.

A. H. SHAPLEY,

I.Q.S.Y. Reporter for World Days
Chairman, International Ursigram and
World Days Service (I.U.W.D.S.)

April 30, 1964.

COSPAR

Report on the C.O.S.P.A.R. Assembly and Space Science Symposium

May 8-20 1964, Florence, Italy

S. SILVER, U.R.S.I. Representative

The Seventh Plenary Meeting of C.O.S.P.A.R. and the Fifth International Space Science Symposium were held May 8-20 in Florence, Italy. The return of C.O.S.P.A.R. to Florence after just a few years since the previous meeting in that city was made to participate in the celebration of the fourth centenary of the birth of Galileo. The programme of the symposium featured a *Galileo Commemorative* Evening Lecture, open to the public, on X-ray and Gamma Ray Astronomy. The lecture was given by Professor B. Rossi.

In accordance with the action taken at the 1963 Assembly in Warsaw the areas covered by the symposium were defined more sharply. The symposium was organized in three sections :

1. Interaction of Energetic Particles with the Atmosphere.
2. Latest Results of Space Research by Means of Rockets or Satellites.
3. Life Sciences and Space Research.

The first part was sponsored jointly by C.O.S.P.A.R. and the following scientific unions : I.A.U., I.U.G.G., I.U.P.A.C., I.U.P.A.P., and U.R.S.I. Each session featured invited review papers and discussions organized under a discussion leader who had been prearranged by invitation. Part 3 of the symposium was organized along similar lines and the results were highly encouraging.

The organization of the symposium marked a new level of cooperation between C.O.S.P.A.R. and the scientific unions and the participation of the Unions in the work of C.O.S.P.A.R. The

Unions should and must assume more responsibility for the activities of C.O.S.P.A.R. as an inter-union committee to aid C.O.S.P.A.R. in being as effective as possible and to maintain the vitality of the Unions themselves.

The interests of C.O.S.P.A.R. and U.R.S.I. overlap, of course, most strongly on the subject of the ionosphere and magnetosphere. The results obtained from top sounders in satellites were covered both in part 1 of the symposium and in contributed papers given under part 2. A layered structure is attributed to the upper ionosphere by Prof. Sayers and his co-workers which is at variance with other interpretations of top-sounding data. Structural detail was described also by King, Eccles, and Smith. This work will bear watching and it will be well for U.R.S.I. to give special attention to this matter at the 1966 General Assembly. Another subject of interest is the mismatch between the profiles of the ionosphere deduced from ground based observations and those deduced from top-sounding satellites. This will also merit attention at our next General Assembly.

The U.R.S.I. Committee on Reorganization and Committee on Space Radio Research both met during the C.O.S.P.A.R. meeting. Dr. Smith-Rose has already reported on the Committee on Reorganization and the minutes of the meeting of the Space Radio Research Committee are being written up by Prof. Beynon. The Space Radio Research Committee took two actions, one to propose to C.O.S.P.A.R. that it be given the responsibility to organize a symposium on the Optimum Design of Instrumentation for Space Experiments from the Standpoint of Data Processing at the next C.O.S.P.A.R. meeting, the other a decision to hold meetings of the Space Radio Research Committee in conjunction with the C.O.S.P.A.R. meetings so as to deal with those topics of C.O.S.P.A.R. and the working groups which lie in the province of the U.R.S.I. The C.O.S.P.A.R. Executive Council responded enthusiastically to these actions. One day of the 1965 Space Science Symposium will be allocated to the topic of Optimum Design. The active participation of the Space Radio Research Committee in the working programme of C.O.S.P.A.R. was welcomed heartily. Some changes in the composition of the Committee may be in order to make this participation more effective.

The action was taken by the Space Radio Research Committee in recognition of the point made earlier, namely, that the Unions must take a more active role in the work of C.O.S.P.A.R. The problems of inter-union relationships and of the relation between C.O.S.P.A.R. and the unions were discussed at some length during the period of the meeting. It is clearly imperative that greater coordination must exist between the activities of the Unions and of C.O.S.P.A.R. The Executive Council of C.O.S.P.A.R. has already taken a great step forward in planning its future programmes with careful consideration for the plans of U.R.S.I., the I.A.U., and the I.U.G.G. (particularly the I.A.G.A.). Prof. van de Hulst, Prof. Silver, and Dr. Friedman were given the task of laying out a programme for C.O.S.P.A.R. for 1965 and 1966. In view of the plans for the joint symposium of the U.R.S.I., I.A.G.A., and I.A.U. on Solar-terrestrial Relationships to be held in 1966 C.O.S.P.A.R. accepted the proposition that that subject would not be a symposium topic in the 1965 and 1966 C.O.S.P.A.R. meetings.

It is clear that with effort and the attitude that the scientific unions and inter-union Committees such as C.O.S.P.A.R. complement one another and are mutually dependent on one another many of the difficulties, some real and some imaginary, which have caused concern will be eliminated. The type of coordination and cooperation which was brought into being at this C.O.S.P.A.R. assembly will bring the much needed order in our international scientific activities.

The composition of the membership of C.O.S.P.A.R. and of the Executive Council has some bearing on the relations between C.O.S.P.A.R. and the Scientific Unions. The number of National Academies adhering to C.O.S.P.A.R. is greater than that adhering to U.R.S.I. and probably any other single union. C.O.S.P.A.R. is in fact more than an inter-union Committee and serves a special purpose of bringing together the wide interests in space research. An interesting development of the present assembly was the number of new countries applying for membership in C.O.S.P.A.R. and the evidence of growing participation of small countries in space research. This does not mean, however, that C.O.S.P.A.R. should become the major scientific body for work in the ionosphere, on solar physics and the interplanetary medium, and planetary

physics. The problem seems to be that of the Unions giving direction to the activities of C.O.S.P.A.R. Of the ten Unions currently represented on the Executive Council of C.O.S.P.A.R. only the I.A.U., the U.R.S.I. and I.U.G.G. are seriously affected by the overlap in scientific interests. While the Unions constitute a majority of the Executive Council only the three mentioned are really vitally concerned and feel a major responsibility for the programme of C.O.S.P.A.R. It is up to these three Unions to find ways and means to make their participation in C.O.S.P.A.R. as effective as possible. It is important for the members of U.R.S.I. to understand the structure of C.O.S.P.A.R. and to realize their own responsibility for coordinating the activity of U.R.S.I. with that of C.O.S.P.A.R. and other Unions whose interests complement those of U.R.S.I.

The Committee of Space Radio Research took the responsibility or getting the organization of the 1966 Belgrade Symposium on Solar-terrestrial Relations under way. Discussions were held with Prof. Nicolet and Prof. van de Hulst. The executive committee of I.A.G.A. met also during the C.O.S.P.A.R. meeting and accepted U.R.S.I.'s invitation to join in organizing the symposium and named Prof. Nicolet and Dr. Roederer as the members of I.A.G.A. on the General Planning Committee of the Symposium. Mr. Ratcliffe and Prof. Booker, chairmen of our Commissions III and IV were designated as the U.R.S.I. members. The action of the I.A.U. is forthcoming. An invitation was extended to C.O.S.P.A.R. to participate in the symposium and C.O.S.P.A.R. members will be put on the appropriate subcommittees.

The 1965 meeting of C.O.S.P.A.R. will be held in Buenos Aires, Argentina in May. The exact dates were not set at this meeting. The scientific symposium will consist of four parts :

1. Optimum Design of Instrumentation for Space Experiments from the Standpoint of Data Processing.
2. Galactic and Extra-galactic Phenomena and Space Research.
3. Latest Results of Space Research by Means of Rockets and Satellites.
4. Life Sciences and Space Research.

As was stated earlier the U.R.S.I. Space Radio Research Committee has the responsibility for part 1.

C.O.S.P.A.R. in plenary session passed a number of resolutions drawn up by the Working Groups and approved by the Executive Council. In the appendix which follows there are given those resolutions of direct interest to U.R.S.I. Resolutions # 6, 15, 16, 17, 23 and 25 may require action on the part of U.R.S.I.

APPENDIX A

C.O.S.P.A.R. RESOLUTIONS

Resolution No. 6.

C.O.S.P.A.R. *realizing* the importance for space science of international agreement on the use of radio frequencies as decided by the I.T.U., and *considering* the role played in the preparation and implementation of these agreements by national administration, *urges* all national space science committees who have not yet established direct contacts with the administrative offices responsible for the use of the radio frequency spectrum in their own countries to make sure that they have channels whereby effective consultation will be possible if and when needed.

Resolution No. 8.

C.O.S.P.A.R. *noting* the fact that the stations at Kerguelen Island (France) and at Sogre, Arkhangelsk (U. S. S. R.) are at geomagnetically conjugated locations situated in a longitude region where conjugate point experiments are not now being conducted, and

being aware of the proposal by the Groupe de Recherches Ionosphériques (France) to carry out at these locations simultaneous micropulsation VLF, riometer and photometric erroral measurements.

gives strong endorsement to the carrying out of such a programme and hopes that the interested French and Soviet groups can make the necessary arrangements to undertake such coordinated observations.

Resolution No. 13.

C.O.S.P.A.R. *notes* that the report of the Panel on Real Time Telemetry finds that there are scientific advantages in providing real time signals (for example, telemetry and radio beacon) for general scientific use and,

recommends that wherever practical real time transmission be considered in the design of such experiments.

Resolution No. 15 (jointly with W. G. 1).

C.O.S.P.A.R. *confirms* the scheme for international designation of satellite and space probes described in Section 2, 3 of the C.O.S.P.A.R. Guide, but for practical reasons *requests* the International Ursigram and World Days Service (I.U.W.D.S.) to assign on behalf of C.O.S.P.A.R. the tentative designations within a few days of launch and to distribute the information in timely bulletins which equate international designations with national names prior to ultimate publication of the final designations in the *C.O.S.P.A.R. Information Bulletin*.

Resolution No. 16.

C.O.S.P.A.R. *recognizing* that certain satellites are especially suitable for broad international participation in scientific studies, and *recalling* the effectiveness of the cooperation of the W.M.O. in making their worldwide communications channels available for the distribution of solar and geophysical alerts during the I.G.Y. and I.Q.S.Y. to a similar group of scientific stations throughout the world, *requests* the W.M.O. to consider the distribution through the same channels of brief launching announcements and if possible a first orbital prediction for the limited number of satellites of this type.

Resolution No. 17.

C.O.S.P.A.R. *recommends* that the exchange of information through the SPACEWARN system include a timely bulletin distributed by mail with a résumé of those satellites which are continuously emitting radio signals (e. g. ionospheric beacon or real time telemetry together with radio frequencies being used), and *invites* launching authorities to provide the necessary information.

Resolution No. 23.

C.O.S.P.A.R. *believing* that the need for international multilingual glossaries of space science terminology (excluding vehicle terminology) requires further study *establishes* a temporary panel

under Working Group 3 for this purpose consisting of Dr. M. Kroshkin and Dr. J. W. King (convenor), Prof. M. Nicolet, Dr. Sneath and Prof. J. Rösch, and

invites National Committees and the various Unions into cooperate with the Panel in an attempt to determine the need for a multi-lingual glossary.

Resolution No. 24.

C.O.S.P.A.R. *recognizing* the fact that very accurate knowledge of the atmospheric parameter in the height range from 8-200 km is necessary in order to improve our physical understanding of the entire thermosphere.

recommends that rocket experiments using different techniques be undertaken simultaneously. Of particular importance is the simultaneous investigation of the chemical composition by mass-spectrometers and by radiation absorption techniques.

Resolution No. 25.

C.O.S.P.A.R. *noting* the importance of space-related problems concerned with the general circulation of the atmosphere as contained in the reports presented to the first session of the plenary meeting of C.O.S.P.A.R. in Warsaw,

recognizing that theoretical and observational studies during the past year have opened up new opportunities to progress toward the solution of these problems and that plans are now moving ahead in several countries that may involve the use of satellites in studies of the general circulation,

believing that international cooperation is mandatory for these studies of a synoptic nature covering the entire world, establishes a new working group 6 with the title « Application of Space Techniques to Atmospheric Circulation », under the chairmanship of Prof. Bolin with the following terms of reference :

- (1) to explore the new scientific possibilities for the study of the general circulation made available as a result of developments in space ;

- 2) to propose the specific scientific research problems to which a world-wide observing system involving satellites should be responsive ;
- (3) to propose the design of scientific experiments involving the use of space vehicles in the study of the general circulation ;
- (4) to coordinate these studies with others directed at energy exchange processes and interactions of the ocean atmosphere ;
- (5) to work with other committees and commissions in the total union structures ;
- (6) to establish such sub-groups as may be necessary.

APPENDIX B

RESOLUTION ADOPTED BY THE EXECUTIVE COUNCIL OF C.O.S.P.A.R.
IN ITS MEETING OF MAY 20, 1964, FLORENCE

C.O.S.P.A.R. notes with appreciation and interest the extensive work done by the Consultative Group on Potentially Harmful Effects of Space Experiments as expressed by the Group in its report and annexes.

C.O.S.P.A.R.

1. *instructs* its Secretariat to make this Report and annexes available to I.C.S.U., the adhering bodies of C.O.S.P.A.R. and other interested parties ;

2. *welcomes* the encouraging conclusions of the Consultative Group that harmful contamination of the upper atmosphere on a long term global basis is unlikely on present and expected scale of firing of super rockets and the release of experimental seeding. C.O.S.P.A.R. urges its adhering organisations to report any major new experiments which may produce harmful contamination. Moreover, it urges them to encourage these scientists to continue studies of the following matters :

- (a) evaluation of exchange times between the various regions of the upper atmosphere, especially between 60 and 100 km,
- (b) short and long term local and zonal effects of rocket contamination in the upper atmosphere,

- (c) the possibility of any catalytic effects which might trigger chemical and photochemical processes in the upper atmosphere, and
- (d) radiation balance in the upper atmosphere and its dependance on changes in composition there

3. *welcomes* the conclusion of the Consultative Group that no interference to optical and/or radio astronomy has resulted from the belt of orbiting dipoles launched in May 1963, and recommends to its Members that any proposals for future experiments of this sort also be given the benefit of thorough evaluation by the scientific community and notably by the International Astronomical Union, in order to check in advance their harmlessness to other scientific research ;

4. *affirms* that the search for extraterrestrial life is an important objective of space research, that the planet Mars may offer the only feasible opportunity to conduct this search during the foreseeable future, that contamination of this planet would make such a search far more difficult and possibly even prevent for all time an unequivocal result, that all practical steps should be taken to ensure that Mars be not biologically contaminated until such time as this search can have been satisfactorily carried out, and that cooperation in proper scheduling of experiments and in use of adequate spacecraft sterilization techniques is required on the part of all deep space probe launching authorities to avoid such contamination ;

5. *accepts*, as tentatively recommended interim objectives, a sterilization level such that the probability of a single viable organism aboard any spacecraft intended for planetary landing or atmospheric penetration would be less than 1×10^{-4} , and a probability limit for accidental planetary impact by unsterilized fly-by or orbiting spacecraft of 3×10^{-5} or less ;

6. *calls* attention to the opinion of its Consultative Group that although less rigorous sterilization techniques are required for lunar landings, because the lunar surface conditions would almost certainly exclude microbial replication, it is desirable that drills designed for deep lunar subsurface boring should be very carefully sterilized to avoid contamination of regions below the surface where a more favorable environment might exist ;

7. *calls* on its members that are concerned with planetary probes to urge the vehicle construction and launching authorities in their countries to try to achieve these sterilization objectives and especially to forego the launching of planetary atmospheric entry and lander vehicles until such time as the abovementioned level of sterility can be achieved with a high degree of certainty ;

8. *requests* its members concerned with planetary probes to report to C.O.S.P.A.R. any disagreement or objections they may have to the use of these tentative objectives or to any other aspects of Annex IV of the Consultative Group Report, and *expresses* the hope that the Consultative Group will arrange continued studies in the area of biological contamination of the moon and planets, taking into account any such reports or comments as may be received ; and finally,

9. *authorizes* the Consultative Group in consultation with the Chairman of Working Group V to arrange for the convening of an international conference on biological sterilization and sterility testing techniques at any time and place and in cooperation with any other scientific organization it may deem appropriate, provided it can be assured in advance of substantial participation in the conference by scientists of both the major deep space probe launching authorities.

**Report to the Executive Council of C.O.S.P.A.R. of the
C.O.S.P.A.R. Consultative group on Potentially Harmful
effects of Space Experiments**

FLORENCE, MAI 1964

1. The Consultative Group was formed in January 1963 with the following composition :

V. SARABHAI (*Chairman*),
C. G. HEDEN,
H. C. VAN DE HULST.
W. W. KELLOGG,
G. A. RATCLIFFE,
G. A. SAVENKO,
V. V. VITKEVITCH.

2. The Group was created in response to the following resolution of the Executive Council of C.O.S.P.A.R. :

« In order to carry out the responsibility for careful, objective, quantitative studies of space experiments with potentially undesirable effects on scientific activities and observations, which C.O.S.P.A.R. has accepted in response to I.C.S.U. resolution 10 (1961) (C.O.S.P.A.R., Doc./62/11), the Executive Council decides to establish a Consultative Group on Potentially Harmful Effects of Space Experiments, to consist of not more than six broadly competent scientists having among them specialized knowledge of Astronomy, Radiation Physics and Chemistry, Communications, Meteorite Penetration and Microbiology, to be named by the President of C.O.S.P.A.R.

It is expected that this Consultative Group will act as a focal point in I.C.S.U. for consideration of all questions regarding potentially harmful effects of space experiments on scientific activities and observations, and that in this capacity it would (1) examine in a preliminary way all questions relating to possibly harmful effects of proposed space experiments, including but not restricted to questions referred to it by any of the I.C.S.U. Unions ; (2) determine whether or not any serious possibility of harmful effects would indeed result from the proposed experiment ; (3) in consultation with appropriate Unions, appoint and arrange for convening an ad hoc Working Group or Groups to study any expected effects which are considered to be potentially harmful, such Working Group or Groups to include competent scientists in the appropriate specialized disciplines ; (4) receive and consider conclusions or recommendations of these ad hoc Working Groups in a timely manner ; and (5) prepare final recommendations to the C.O.S.P.A.R. Executive Council for its further action.

Positive or negative recommendations or studies considered appropriate by the Council for dissemination would then be made available to all C.O.S.P.A.R. adherents, the I.C.S.U. Bureau, the appropriate Unions of I.C.S.U., and to appropriate bodies of the United Nations or its specialized agencies. »

3. The Group has met in : Paris, March 1963.
Warsaw, June 1963.
Geneva, February 1964.
Florence, May 1964.

In a preliminary report submitted to C.O.S.P.A.R. at Warsaw in June 1963, it was stated that the Group was initially concerning itself with the following topics :

- (a) Pollution of the Upper Atmosphere.
- (b) Orbiting Dipoles.
- (c) Contamination of the Moon and Planets.

The present report gives the current status of the studies on each topic. Appendices incorporate statements by the Group on those topics for which the Group feels it is appropriate to do so at the present time.

4. The Group has approached its task broadly as follows. It has discussed and attempted to identify the scientific questions involved in each problem by studying existing literature. Where the literature has been available in widely scattered sources, as in the problem of contamination of planets, the Group has arranged for a compilation of the literature to facilitate its evaluation.

At times an individual member of the Group has critically examined current scientific information and prepared his own report which has been used for stimulating further comments and discussions.

The Group has then consulted individual scientists and scientific groups. Where discrepancies or divergent opinions have emerged, the Group has attempted to bring together the specialists concerned in order to resolve differences if possible, or at least to evolve a consensus and a clarification for further studies.

In attempting quantitative evaluation of potentially harmful effects, the Group has thus relied heavily on assistance of scientists and scientific organizations.

5. The present status of the studies can be summarized as follows :

- (a) *Pollution of the Upper Atmosphere.*

A statement by the Group is enclosed as Annex 1. It gives an evaluation of likely consequences to environmental conditions of the firing of a relatively large number of super rockets per year and of the extensive use of chemical tracers in the upper atmosphere. It also indicates the uncertainties in our present knowledge, and the need for further quantitative studies.

(b) *Orbiting Dipoles.*

A statement by the Group is enclosed as Annex 2. It represents agreed views of leading specialists in the field providing a basis for quantitative evaluation of the consequences of a dipole belt of given characteristics of radio and optical astronomy.

(c) *Contamination of the Moon and Planets.*

The Group decided at its meeting in February 1964 that a statement as reproduced in Annex 3 be immediately communicated to C.O.S.P.A.R. on behalf of the Group. This points out the extreme importance of undertaking, for the time being, only fly-by missions for the study of Mars.

Following the compilation of available literature on the subject, a Panel of the following specialists has met in Florence during the C.O.S.P.A.R. Symposium in May 1964.

Members :

Prof. A. BROWN, Dept. of Biology, Univ. of Pennsylvania.

Prof. A. DOLLFUS, Astrophysics Section, Paris Observatory.

Prof. M. FLORKIN, Biochemical Laboratory, University of Liège.

Dr. L. HALL, Bioscience Programs N.A.S.A.

Acad. A. A. IMSHENETSKII, Inst. of Microbiology, U. S. S. R.
Academy of Sciences.

Prof. C. SAGAN, Harvard College Observatory (Rapporteur).

Dr. P. H. A. SNEATH, British Medical Research Council.

— Additional Russian member (not present).

Prof. C. G. HEDEN (Convenor).

The Panel Has discussed the standards of sterilization which can be recommended for the protection of possible life on Mars. Its report is enclosed in Annex 4.

The Group has considered the report of the Panel, and in relation to its statement contained in Annex 3 invites special attention to remarks concerning the danger of contamination through accidental landings of fly-by missions and the definitive steps suggested to reduce this danger.

The Group urges continued efforts for the improvement of

sterilization techniques and full sharing of information concerning procedures designed to achieve spacecraft with the required level of sterility.

The Group recommends early action to declare Mars a biological preserve to ensure that the exploration of this planet, considerations of biological research receive priority over others.

The group recommends the proposal for convening an international conference in early 1965 to consider the technology of sterilization and sterilization testing.

6. In concluding the present report, the Group wishes to thank the scientists and scientific organizations who have made possible the studies which have been undertaken.

ANNEX I

STATEMENT ON UPPER ATMOSPHERIC POLLUTION BY ROCKET EXHAUST AND CHEMICAL INJECTION EXPERIMENTS

by the C.O.S.P.A.R. Consultative Group

on

Potentially Harmful Effects on Space Experiments

Florence, 16 May 1964

1. Interest and concern about the possible effects of space experiments, particularly those involving large rockets or the repeated injection of metallic vapors, on the composition and structure of the Earth's atmosphere had been occasionally expressed before C.O.S.P.A.R. decided to set up its Consultative Group on Potentially Harmful Effects of Space Experiments (May, 1962). A request to C.O.S.P.A.R. by the I.C.S.U. Executive Board in October 1962 (Resolution EB XIV 27) suggested a study of this topic. However the publicity given to a report (part of a series) on rocket pollution of the upper atmosphere by J. Pressman, W. Reidy and W. Lank (Institute of Aerospace Science, January 1963) created a certain amount of public concern. Hence, this problem was selected at once by the Consultative Group as deserving further study.

2. The C.O.S.P.A.R. Consultative Group has been instructed by its Charter «to arrange for careful quantitative studies» of the problems referred to it, in order that the conclusions of such studies may be available to all concerned. The arrangements in the present case were as follows : Copies of the Pressman report were obtained and W. W. Kellogg, a member of the Consultative Group, was asked to prepare an independent report, reviewing the general question in as quantitative a way as possible. The two reports, which arrived in part at rather different conclusions, were then submitted to a number of experts in the world with a request for criticism and comments. The comments received from 20 experts in 6 countries (Belgium, Germany, India, Netherlands, United Kingdom, U. S. A.) were reviewed at a meeting of the Consultative Group in February 1964. A second version of Kellogg's report, taking these comments into account will be published in an international scientific journal and reprints will be available from the C.O.S.P.A.R. Secretariat.

3. While there was not absolute unanimity in the views of the experts who volunteered comments, the following is believed by the Consultative Group to be a fair consensus of the situation as it is now understood.

There are a variety of ways in which man can alter the conditions in the upper atmosphere, and the degree of such alteration can obviously vary over a wide range. Some such effects are merely detectable, and are probably not «potentially harmful», while there are other changes that cause interference with future experiments or that can be considered as harmful in other ways. In order to discuss the vastly different effects that could be caused by injections of chemicals into the upper atmosphere, it has been convenient to distinguish between four classes of effects which are :

- (a) a harmless, short term and localized alteration of the upper atmosphere that can be readily observed at the ground.
- (b) A long term and worldwide alteration of the observable characteristics of the upper atmosphere, but one which causes no identifiable interference or harmful effect.
- (c) An extensive alteration of the upper atmosphere that interferes with scientific experiments or other human activities.
- (d) An atmospheric alteration that affects man's environment.

4. It appears that there are many instances where (a) has occurred. For example, local effects of the passage of a large rocket through the upper atmosphere can be observed visually, especially at twilight when it may leave a bright trail, and perturbations of the ionosphere by large rockets, detectable by radio means, have been observed repeatedly; none of these more or less localized phenomena have been judged as «harmful». On the other hand (b) has not occurred, with the possible exception of the reported instances where the lithium content of the upper atmosphere may have been affected on a worldwide basis for a few months in 1962 by man-made injections. There has not been an instance of (c) as far as chemical injections are concerned, but the worldwide background of some radioactive tracers (tritium, carbon-14, etc.) has been changed by repeated injections, and this has interfered with certain studies of circulation and exchange rates between regions of the atmosphere. Case (d) has not occurred, and seems most unlikely. The reasons for this opinion are outlined in part in the next paragraphs.

5. In order for the atmosphere to be so changed that the environment of life is affected — case (d) —, the pollution of the upper atmosphere would surely have to be very extensive, and so we must distinguish between long-term and short-term pollutants, and concentrate on the former. If at a certain injection rate a pollutant builds up a concentration exceeding a specified value in a relevant region, we refer to it as a long-term pollutant. It is obvious that the specified limiting value must differ with different pollutants, and also for the same pollutant with reference to different effects.

A worldwide long-term change of the background concentration of some atmospheric constituent that would be just detectable might be 10 % or less for a relatively well mixed and permanent gas (e.g. CO₂, CH₄), and it might be by a factor of two or three for constituents that vary a great deal naturally (e.g. H₂O, NO, Li). Considering what would be involved in causing a change of the composition of the upper atmosphere above 60 or 70 km, the region above the stratosphere, it is necessary to know what the rate of depletion of a given substance is due to mixing and dissociation (by sunlight and chemical reaction), and also what its natural concentration is. These are only known very approximately,

but it seems that on the order of 10^5 to 10^6 *tons per year* of water vapor or nitric oxide would have to be injected above 60 km to double the amounts of these gases worldwide, and about the same tonnage would be required to add 10 % to the carbon dioxide content. (This corresponds approximately to an annual launching of 10^3 to 10^4 Saturn-type rockets, or of the type of Soviet rocket used to put the second Soviet cosmonaut into orbit). On the other hand, only 2×10^3 to 10^4 *kilograms per year* of atomic sodium would have to be injected above 60 km to double this constituent, and only a few tens of kilograms of lithium annually would be expected to double its background concentration. These last figures are within the capability of man now, and may (as mentioned above) have already been achieved temporarily in the case of lithium. The larger figures for nitric oxide, carbon dioxide, and water vapor, the main combustion products of rocket fuels, seem unattainable in the foreseeable future.

The Consultative Group is aware of the various dire consequences of contamination that have been cited in certain public pronouncements, and has examined them as far as present knowledge would permit. (Examples of these are : the removal of the ozone layer, thereby permitting far ultraviolet sunlight through to the ground ; the removal of the free electrons in the ionosphere by introducing an electron « getter » in large quantities ; changing the temperature of the atmosphere by changing the water vapor or carbon dioxide content, etc.). We are unable to identify any physical processes which would produce these consequences. Although it is always possible that there might be other undesirable effects which have not been anticipated, this seems unlikely.

6. The present study, which is based on information in the open literature, while providing some comfort as regards climatological changes which may be induced by the rocket gases in the foreseeable future, indicates the need for early experimental and theoretical studies dealing with the following problems :

- (a) the evaluation of exchange times between the various regions of the upper atmosphere, especially between 60 and 100 km, where current estimates of diffusion rates differ by 2 orders of magnitude in extreme cases and by an order of magnitude generally.
- (b) The short term local and zonal effects of rocket contamination.

- (c) Possible catalytic effects which might trigger chemical and photochemical processes as yet unanticipated.
- (d) Radiation balance in the upper atmosphere and the effects on it of changes in composition there.

In view of the importance of developing a sound scientific capability for accurate predictions of the effects of future space operations and experiments which may involve injecting larger amounts of materials with different chemical and physical characteristics, the Consultative Group suggests that C.O.S.P.A.R. urges scientists, particularly those of nations which are active in space exploration with large rockets, to undertake serious quantitative studies which could provide answers to some of these questions in the near future.

7. The present study does not include three contingencies of possible significance to the pollution of the upper atmosphere and which may be realized in the next few years. These are :

- (a) The use of nuclear powered rockets and nuclear reactors in satellites.
- (b) The extensive use of high-flying supersonic transport aircraft.
- (c) The extensive use of completely disintegrating meteorological rockets.

It is intended that the Consultative Group will examine these contingencies in a preliminary way during the next year, and will arrange for more detailed studies if warranted.

ANNEX 2

STATEMENT ON BELTS OF ORBITING DIPOLES

by

*The C.O.S.P.A.R. Consultative Group on
Potentially Harmful Effects of Space Experiments*

Florence, 16 May 1964

Belts of orbiting dipoles (needles) have been proposed for the use of a telecommunication system between stations at the earth's

surface. Two experiments to create a test belt of this nature have come to our knowledge. The first, launched October 1961, did not dispense separate needles; the second, launched May 12, 1963, went as planned. The first announcement of this plan, about August 1960, created grave concern about the possible interference to be expected in optical astronomy by scattered sunlight and in radio astronomy by scattered signals from radio stations on the earth. The calculation of this interference by a specified belt contains no major uncertain factors. It was soon ascertained that the effects of the specified belt would be hardly measurable and would not cause harmful interference. This has been confirmed by the observations of the actual test belt.

In view of initial uncertainties about the life time and in view of the expressed fear that frequent launchings or far denser belts might be proposed, the problem was held under review by several committees of experts. The most important ones, the « West Ford Committee » of the International Astronomical Union and the « Ad hoc West Ford Committee » of the Space Science Board of the National Academy of Sciences of the U. S. A., have now produced their reports with identical conclusions.

The C.O.S.P.A.R. Consultative Group on Potentially Harmful Effects of Space Experiments has frequently consulted with members of both committees and is in concurrence with their conclusions. It feels no need, therefore, to repeat these conclusions in detail. The observations and calculations have been published in scientific journals.

As an illustration of the *optical* effects, we may mention that the scattered sunlight received from the test belt a week after launch was a factor 10 below the brightness of faintest measured parts of galaxies, the study of which forms one of the basic means by which present-day astronomy penetrates the problems of the universe. This margin gets wider as the belt spreads in time.

The possible interference to *radio* astronomy has been newly evaluated by Findlay and Ryle with a view to the types of radio-telescopes that may come into operation within 10 years. Interference equal to 1/10th of the effective limit of detection would be produced with a single 10 kW transmitter illuminating part of a belt with a dipole density 5-10 times that of the 60-day West Ford belt.

ANNEX 3

STATEMENT BY THE CONSULTATIVE GROUP ON
POTENTIALLY HARMFUL EFFECTS OF SPACE EXPERIMENTS

concerning

The Contamination of Planets

Geneva, 1964

« The C.O.S.P.A.R. Consultative Group on Potentially Harmful Effects of Space Experiments has considered presently available scientific evaluations of the likely consequences of the biological contamination of Mars. There is consensus of opinion among scientific workers of the extreme importance of not jeopardizing the value of information that can be gained from studies of this planet about many crucial problems of biology and the evolution of life. Realizing that the technology of sterilization has many practical problems, the Group is endeavouring to establish through consultation with competent biologists the limits of permissible contamination of objects that may land on Mars. The Group moreover recommends that early discussions be held between specialists of launching nations to discuss techniques of sterilization and problems of technology involved in launching sterilized payloads. In the meantime, the Group urges these nations who presently have capability of attempting the exploration of Mars, to take steps to organize only fly-by missions for the time being. »

ANNEX 4

REPORT OF THE PANEL ON
STANDARDS FOR SPACE PROBE STERILIZATION

At the Florence meeting of C.O.S.P.A.R., the Panel on Standards for Space Probe Sterilization considered data and expressions of expert opinion from a variety of sources. The following statements represent a synthesis of the members of the Panel; it is suggested that they be made the basis of a position paper by C.O.S.P.A.R.

We reaffirm the conviction that exobiology should be a primary objective of activities in the space sciences. This view is justified for the following reasons :

- (1) The detection and subsequent investigation of extraterrestrial life has profound scientific significance.
- (2) Studies in planetary biology must, in large part, be completed before contamination is effected by unsterilized devices used in physical or geophysical investigations. The successful performance of physical experiments is primarily unaffected by previous biological experiments ; because of contamination, the converse may be false.
- (3) A study of the prebiological chemistry of a planet which proves to be sterile would nevertheless be of major biological significance.

We *believe* that space probe sterilization and trajectory control of fly-by spacecraft are essential until further information gives strong indication that such standards could be relaxed without jeopardizing planetary studies. This policy is justified for the following reasons :

- (1) A search for extraterrestrial life is essentially a search for materials with the properties of the known organisms on the planet Earth. Therefore all life-detection experiments will be capable of detecting viable terrestrial contaminants. Consequently the introduction of such contaminants (for example, by inadequate spacecraft sterilization) would render it impossible to decide whether positive results of a life-detection experiment are significant or spurious.
- (2) Aside from such interference with remote life-detection experiments, biological contamination of a planet may lead to undesirable alterations of the planetary environment from the standpoints of both exobiology and physical studies of planetary surfaces. If the proliferation of terrestrial contaminants — at some time after their introduction — is *not* excluded, the extensive changes in the planetary environment which are possible as a consequence *could* inhibit or destroy our opportunity to:
 - (a) identify and investigate the indigenous biota,
 - (b) understand the ecological interactions of the original indigenous biota, and

(c) investigate the prebiological chemistry of a planet which proves to be sterile.

It is difficult to estimate adequately the period of time which would pass before such undesirable consequences occur. As a simple example of heuristic interest we note that a single viable organism deposited in an environment in which it slowly grows (general time, 30 days) would in the course of eight years produce a population of 10^{27} organisms, a number equal approximately to the bacterial population of the Earth. The calculation assumes zero death rate, and no interaction between indigenous planetary organisms and exogenous terrestrial contaminants.

We *believe* that the scientific desirability of sterility control is absolute; but the degree of sterilization required must be based on our judgements of the risks acceptable so planetary exploration will not be impossibly difficult. The probability that a single viable organism is aboard any space vehicle intended for planetary impact can then be computed as the solution of a waiting time problem in probability theory. Adopting values for the acceptable risk during approximately a decade of planetary exploration by landing vehicles, and for the biological and spacecraft reliability parameters involved — values which we consider conservative — we conclude that

(1) the probability that a single viable organism be aboard any vehicle intended for planetary landing must be less than

$$1 \times 10^{-4} \qquad \text{and that}$$

(2) the probability of accidental planetary impact by an unsterilized fly-by or orbiter must be less than

$$3 \times 10^{-5}$$

during the interval terminating at the end of the initial period of planetary exploration by landing vehicles (approx. one decade).

We appreciate the considerable technical difficulties involved in realizing these probabilities in practice, but we consider that they are attainable by known means. The probabilities also apply to contamination by spacecraft propulsion and attitude-control systems. The probability of contamination by accidental impact of fly-bys and orbiters can be minimized by

(1) initial trajectory control,

- (2) initial spacecraft sterilization, or by
- (3) inclusion of programmed or commanded terminal precautionary systems for assuming non-intercept trajectories or for initiating destruction sterilization.

The probabilities given above are obviously subject to future revision as our knowledge of planetary environments, microbial ecology, and spacecraft design improves.

We *feel* that while our recommendations apply immediately to fly-by, orbiter, and lander missions planned for Mars, the same recommendations should apply to any planet which, on the basis of current information, cannot *firmly* be excluded as a possible abode of extraterrestrial life. The standards of space vehicle sterilization are, we believe, unrelated to the probability of indigenous life on the planet in question; except in the limiting case that indigenous life and the proliferation of terrestrial contaminants can both be firmly excluded. While there is a sizable probability that the surface temperatures of Venus are too high for either indigenous or exogenous organisms, this conclusion is based on indirect lines of argument. Also, we cannot entirely exclude the possibility of biological contamination of the clouds of Venus. Until unambiguous astronomical information is available, we recommend that Martian standards of sterility control should also apply to Venus. In the case of the Moon, the surface conditions are rigorous enough to reliably exclude biological contamination of the *surface*. We cannot exclude the possibility that conditions several tens of metres below the lunar surface will permit microbial replication. Such depths, however, are unlikely to be reached unintentionally during lunar landings. Accordingly, we recommend such less rigorous sterilization techniques as bio-cleanroom assembly and terminal gaseous sterilization of all spacecraft intended for lunar landings; but rigorous sterilization of drills designed for lunar subsurface boring. Our information about the conditions on other planets is insufficient to form a basis for definitive recommendations at this time.

To encourage broader consideration of the diverse means which can be employed to meet these recommended standards of sterility, it is suggested that an international conference be sponsored by C.O.S.P.A.R., possibly in cooperation with one or more

other appropriate international scientific groups, to consider the technology of sterilization, and sterilization testing. To implement this suggestion, it will be necessary for C.O.S.P.A.R. to endorse the proposed conference and to supply a budget for bringing it about. It is suggested further that the conference be held as soon as feasible, preferably in early 1965.

I. G. Y.

Publications

Pergamon Presse Ltd (Heading Hill Hall, Oxford, U. K.) has published the Catalogue with compiled tables of volumes 1-36 of the Annals of the International Geophysical Year. Copies of this Catalogue are available free of charge, upon request to Pergamon Press.

I. C. S. U.

I.C.S.U. Executive Committee — June 1964

Report on the activities of U.R.S.I.

by SMITH-ROSE (*President, 1960-63*)

1. At the XIVth General Assembly in Tokyo in September 1963, the International Scientific Radio Union (U.R.S.I.) celebrated the 50th anniversary of its formation : and a Golden Jubilee Memorial Volume was published containing brief historical accounts of the work of its seven commissions and associated special committees and services.

2. As a tribute to the memory of the late Professor Balth van der Pol, who was actively associated with the work of U.R.S.I., a short lecture reviewing his interest in radio was given at Tokyo by Professor Ch. Mannebach, Treasurer of U.R.S.I.

3. In memory of her late husband, Mrs. van der Pol has very generously established within U.R.S.I. the necessary funds for a Gold Medal to be awarded at each General Assembly to the scientist who, in the opinion of the Board of Officers of U.R.S.I., has made the most important contribution to scientific radio during the preceding three years.

On the occasion of the XIVth General Assembly in Tokyo, the medal was awarded to Professor Martin Ryle, F. R. S. who, after receiving the medal, gave a short lecture on his recent work on the development of radio astronomical telescopes of large aperture.

4. The Resolutions adopted by the General Assembly on submissions from the Executive Committee and from the Commissions and Joint Committees, have been published in the *U.R.S.I. Information Bulletin*, No. 140 (September-October 1963).

5. In accordance with one of these Resolutions, the Board of Officers at a meeting in Brussels in February 1964, set up a committee to investigate the future structure of U.R.S.I., with particular reference to the needs of research in the broad and rapidly developing field of Solar-Terrestrial Physics, bringing together the closely allied subjects of ionospheric and solar physics, aeronomy and geomagnetism.

6. This committee, which was requested to report within one year, held its first meeting of the members who attended the C.O.S.P.A.R. Symposium in Florence (May, 1964), and recommended that :

- (a) the U.R.S.I. Symposium on solar-terrestrial physics to take place in Belgrade in August 1966, should be organised with the invited co-operation of I.A.G.A. and C.O.S.P.A.R., as other interested members of I.C.S.U. ;
- (b) the chairmen of Commissions III, IV and IVa of U.R.S.I. should organise the detailed programme of this Symposium ; and also discuss forthwith the future scope of these Commissions, which deal respectively with the Ionosphere, the Magnetosphere and with Radio Noise of Terrestrial Origin ;
- (c) a full meeting of the committee on the Future Structure of U.R.S.I. should be arranged in the near future, perhaps in association with the next meeting of the co-ordinating Committee of U.R.S.I.

7. The General Assembly of U.R.S.I. also noted that the Association of Geomagnetism and Aeronomy (I.A.G.A.) has similarly appointed a committee to discuss the new field of Solar-Terrestrial Physics ; and it was anticipated that there would be co-ordination between these committees at an appropriate future date.

8. At Tokyo, it was decided that the XVth General Assembly should be held in Munich in August/September 1966, immediately following the Symposium mentioned in 6 (a) above.

9. Some of the Committees of U.R.S.I. — the Space Radio Research Committee, the International Ursigram and World Days Service, and the International Years of the Quiet Sun — also held brief interim meetings in Florence.

I.C.S.U. Bulletin

Number 1 (May 1964) of the *I.C.S.U. Bulletin* has just been issued by the I.C.S.U. Secretariat, 2 via Sebenico, Rome, Italy.

This issue contains inter alia :

- A summarized report on the Tenth General Assembly of I.C.S.U.
- News from Scientific Unions (Astronomy, Geography, Physical Sciences).
- News from National Members (Republic of South Africa and Republic of Vietnam).
- News from Committees, Commissions and Permanent Services (International Quiet Sun Years, Space Research, Frequency Allocations, Radiometeorology, Solar and Terrestrial Relationships, Atmospheric Sciences, etc.).
- I.C.S.U. Profiles (H. W. THOMSON, President, and D. BLASKOVIC, Secretary General).
- Calendar of Meetings 1964.

UNION INTERNATIONALE DES TÉLÉCOMMUNICATIONS

Conférence Administrative Extraordinaire Genève 1963

L'U.I.T. a publié les *Actes Finals* de la Conférence Administrative Extraordinaire des Radiocommunications chargée d'attribuer des bandes de fréquences pour les radiocommunications spatiales, Genève 1963.

Extraordinary Administrative Conference, Geneva 1963

I.T.U. has issued the *Final Acts* of the Extraordinary Administrative Radio Conference to allocate frequency bands for space radiocommunications, Geneva 1963.

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE (C. E. I.)

(English text p. 96)

Rapport du Bureau Central pour 1963

La C.E.I. vient de publier le Rapport du Bureau Central pour 1963.

Pour l'information de nos lecteurs nous extrayons de ce rapport quelques renseignements de nature à les intéresser.

CONSEIL

Président : Professeur G. DE ZOETEN.

Président sortant : D^r. HERLITZ.

Présidents d'honneur :

Professeur J. A. DE ARTIGAS.

Général E. E. WIENER.

Trésorier : D^r A. ROTH.

Secrétaire général : L. RUPPERT.

COMITÉS NATIONAUX

Afrique du Sud	Danemark	Pays-Bas
Allemagne	Espagne	Pologne
Argentine	Etats Unis d'Amérique	Portugal
Australie	Finlande	République Arabe Unie
Autriche	France	Roumanie
Belgique	Grèce	Royaume-Uni
Brésil	Hongrie	Suède
Bulgarie	Inde	Suisse
Canada	Israël	Tchécoslovaquie
Chine (République Populaire de)	Italie	Turquie
Corée (République)	Japon	Union des Républiques Socialistes Soviétiques
Corée (République Dé- mocratique et Popu- laire de)	Norvège	Vénézuela
	Pakistan	Yougoslavie

RÉUNIONS

Prochaines Réunions générales :

- 1964 — La Réunion générale se tiendra à Aix-les-Bains (France) du 19 au 30 mai.
 1965 — La Réunion générale se tiendra à Tokio (Japon).
 1966 — Le Comité National Israélien examine la possibilité d'inviter la C.E.I. à tenir sa Réunion générale en Israël en 1966.

RÉUNIONS TENUES EN 1963

Titre	Lieu	Date	P.V.
Nomenclature	Bruxelles	Septembre	817
Symboles graphiques	Venise	Juin	772
Radiocommunications	Venise	Juin	777
Matériel de réception radio- électrique	La Haye	Février	269
	Venise	Mai	778
Matériel d'émission radioélec- trique	Venise	Mai/juin	780
Appareils de mesure	Budapest	Septembre	804
Compteurs	Budapest	Septembre	805
Appareils de mesure indicateurs	Budapest	Septembre	806
Appareils de mesure élec- troniques	Budapest	Septembre	807
	Venise	Mai	781
Convertisseurs à semiconduc- teurs	Montreux	Septembre	813
Condensateurs et résistances pour équipements électro- niques	Venise	Mai	798
	Venise	Mai/juin	801
Appareils électriques de mesure utilisés en relation avec les rayonnements ionisants	Bad Kreuznach	Octobre	821
Cristaux piézoélectriques et dis- positifs associés	Venise	Juin	802
Calculateurs et traitement de l'information	Copenhague	Septembre	808
Transmission de l'information codée	Copenhague	Septembre	810

COMITÉS D'ETUDES

C.E. 1. — *Nomenclature*

Président : M. F. CAHEN (France).

Secrétariat : France (M. Ch. DIETSCH).

Dernière réunion : Bruxelles, 1963.

Deuxième édition du Vocabulaire Electrotechnique International

1. Groupes publiés :

05 — Définitions fondamentales (France).

07 — Electronique (France).

12 — Transducteurs magnétiques (Suède).

20 — Appareils de mesure scientifiques et industriels (France).

62 — Guides d'ondes (Royaume-Uni).

3. Groupes dont le texte définitif est en cours d'élaboration en vue de sa publication :

60 — Radiocommunications (Royaume-Unis).

5. Groupe dont un projet révisé accompagné d'un complément doit être soumis pour approbation :

66 — Détection et mesure par voie électrique de rayonnements ionisants (France).

7. Index alphabétique :

Cet index alphabétique général est établi par le Comité Electrotechnique Espagnol. La publication d'une édition groupant tous les termes figurant dans les fascicules déjà parus de la deuxième édition du V.E.I. est prévue pour 1965.

Prochaine réunion : Aix-les-Bains, 1964.

C.E. 3. — *Symboles graphiques*

Président : M. A. LANGE (France).

Secrétariat : Suisse (M. H. BENNINGER).

Dernière réunion : Venise, 1963.

Publications en cours d'impression :

117-6 (1^{re} édition) — 6^e partie : Exemples de résistances, éléments de tubes électroniques, soupapes et redresseurs.

Document diffusé :

- 3 (B.C.) 464 — Révision du 3 (B.C.) 456 — Symbole pour dispositifs à semiconducteurs.

Projets diffusés :

- 3 (B.C.) 462 — Transducteurs et amplificateurs magnétiques.
3 (B.C.) 463 — Exemples de tubes électroniques, soupapes et redresseurs.

Questions à l'étude :

- Exemples supplémentaires de symboles pour éléments de tubes électroniques.
- Eléments de tubes pour hyperfréquences (Groupe de Travail 1).
- Calculateurs électroniques (Groupe de Travail 2).
- Groupe de Travail Mixte C.C.I./C.E.I. pour les symboles graphiques concernant les télécommunications :
- Groupe de Travail Mixte C.C.I./C.E.I. pour les symboles graphiques concernant les télécommunications :

Ce groupe a tenu trois réunions lors de l'année 1963.

Autre question :

Symboles recommandés pour les dispositifs de connexion et les organes de commande des appareils de radiocommunications et des dispositifs électroniques basés sur des techniques analogues. Cette question sera traitée par un Groupe de Travail du C.E. 12.

Prochaine réunion : Aix-les-Bains, 1964.

C.E. 12. — *Radiocommunications*

Président : M. P. BESSON (France).

Secrétariat : Pays-Bas.

Dernière réunion, Venise, 1963.

Publication en cours d'impression :

- 138A — Complément à la Publication 138 (1962) : Méthodes pour les mesures des propriétés électriques essentielles des antennes de réception dans la gamme de fréquence de 30 MHz à 1000 MHz.

Domaine d'activité révisé :

Lors de sa réunion tenue à Venise en juin 1963, le Comité d'Action a approuvé le libellé ci-après du domaine d'activité du C.E. 12 :

« Etablir des recommandations internationales concernant le matériel utilisé pour les radiocommunications et les dispositifs électroniques basés sur des techniques analogues, à l'exception de ceux relevant explicitement d'un autre Comité d'Etudes. Suivant les cas, ces recommandations énumèrent les caractéristiques, fixent leurs valeurs normales, décrivent les moyens de vérification et les méthodes de mesure appropriées ; elles précisent les dispositions que requièrent la sécurité des personnes et la prévention du feu. »

Question à l'étude :

Symboles recommandés pour les dispositifs de connexion et les organes de commande des appareils de radiocommunications et des dispositifs électroniques basés sur des techniques analogues.

Prochaine réunion : Date non encore fixée.

S.C. 12A. — *Matériel de réception radioélectrique*

Président : M. S. A. C. PEDERSON (Danemark).

Secrétariat : Pays-Bas.

Dernières réunions : La Haye, 1963 ; Venise, 1963.

Questions à l'étude :

— Révision de la Publication 69 (1954) — Méthodes recommandées pour les mesures sur les récepteurs radiophoniques pour émissions de radiodiffusion à modulation d'amplitude — Nouveaux projets du Secrétariat à diffuser pour la partie A : Généralités, la partie B : Mesures aux fréquences acoustiques, la partie C : Mesures aux fréquences radioélectriques sur les récepteurs pour émissions à modulation d'amplitude, la partie X : Mesure de la sensibilité aux perturbations du type impulsif des récepteurs à modulation de fréquence utilisés dans la gamme de fréquence jusqu'à 300 MHz, et la partie Y : Mesure de la sensibilité aux perturbations des récepteurs pour émissions à modulation d'amplitude utilisés dans la gamme de fréquence de 150 kHz à 1605 kHz. Le Secrétariat préparera également

un supplément étendant la partie Y à la gamme de fréquence jusqu'à 30 MHz.

- Antennes — Contre-polarisation, polarisation circulaire, réception par feeder, largeur de bandes, dispositif pour la production d'un champ normalisé, mesure sur les antennes pour modulation d'amplitude, mesures sur les systèmes complets, différents types d'antennes artificielles.
- Supplément à la Publication 107 (1960) — Méthodes recommandées pour les mesures sur les récepteurs de télévision, concernant les mesures relatives aux commandes automatiques.
- Mesures du rayonnement (G.T. 1) — Méthodes analytiques de mesure des rayonnements en laboratoire dans la gamme de fréquence de 30 MHz à 1000 MHz, corrélation entre les diverses méthodes de mesure, chambres sourdes radioélectriques, réseau fictif d'alimentation, mesure du rayonnement des bases de temps sur les bornes d'antenne, mesure du rayonnement sur la fréquence intermédiaire à des fréquences supérieures à celles qui sont envisagées dans la Publication 106A, récepteurs combinés radio et télévision, récepteurs utilisant des sous-porteuses.
- Sensibilité aux perturbations (G.T. 2) — Sensibilité des récepteurs à modulation de fréquence à des perturbations autres que celles produites par les moteurs d'automobiles, détermination du réseau de charge d'antenne et de terre pour les récepteurs à impédance de source spécifiée, sensibilité des récepteurs de télévision aux perturbations.
- Systèmes d'antennes collectives — Un nouveau Groupe de Travail (G.T. 3) a été constitué pour traiter des problèmes posés par cette question.
- Récepteurs pour usages professionnels.
- Générateurs de champ magnétique pour une gamme de fréquences jusqu'à 30 MHz.
- Stéréophonie.

Prochaine réunion : Date non encore fixée.

S.C. 12B. — *Sécurité*

Président : M. P. D. POPPE (Norvège).

Secrétariat : Pays-Bas.

Dernière réunion : Venise, 1963.

Document diffusé :

12B (B.C.) 28 — Modifications au 12B (B.C.) 25 — Règles de sécurité pour appareils électroniques et appareils dérivés, à usage domestique et à usage analogue, reliés à un réseau.

Questions à l'étude :

- Examen complémentaire des échauffements admissibles, en tenant également compte des risques d'incendie.
- Règles supplémentaires pour les circuits imprimés (en coopération avec le C.E. 52).

Autres sujets à examiner (sous réserve de l'approbation des Comités nationaux) :

- Règles supplémentaires pour les conditions tropicales (éventuellement en combinaison avec les règles supplémentaires pour l'équipement pour l'essai de l'influence des chutes d'eau verticales et des projections d'eau).
- Règles plus détaillées pour l'emploi de bois imprégné comme matériau isolant.
- Règles détaillées pour un essai des couches isolantes sur l'intérieur des enveloppes métalliques.
- Règles pour les récepteurs professionnels de radiodiffusion.
- Règles pour les équipements fonctionnant sur piles avec possibilité de branchement sur le secteur.

Prochaine réunion : Date non encore fixée.

S.C. 12 C. — *Matériel d'Emission radioélectrique*

Président : M. C. BEURTHERET (France).

Secrétariat : Pays-Bas.

Dernière réunion : Venise, 1963.

Projets approuvés pour publication :

Règles de sécurité pour le matériel d'émission radioélectrique :

1^{re} partie : Règles — 12 C (B.C.) 5.

2^e partie : Méthodes d'essai — 12C (B.C.) 6.

Projets approuvés pour diffusion :

Méthodes de mesure pour le matériel d'émission radioélectrique

1^{re} partie : Généralités.

2^e partie : Puissance consommée, facteur de puissance global et rendement global.

3^e partie : Détermination de la puissance de sortie.

4^e partie : Caractéristique de la puissance de sortie en fonction de la fréquence radioélectrique.

5^e partie : Mesures de fréquence.

Questions à l'étude :

— Méthodes de mesure pour le matériel d'émission radioélectrique :

6^e partie : Mesures de la largeur de bande, de la puissance sur les fréquences hors bandes et sur les fréquences non essentielles.

7^e partie : Mesures ayant trait à la modulation.

8^e partie : Mesures de distorsion.

9^e partie : Mesures des propriétés des émetteurs de télévision.

— Révision des publications concernant les règles de sécurité pour le matériel d'émission radioélectrique.

— Document concernant les règles applicables au personnel qualifié, à préparer en liaison avec l'Union Internationale des Télécommunications (U. I. T.).

Travaux futurs :

Méthodes de mesure applicables aux antennes et systèmes d'antennes.

Prochaine réunion : Date non encore fixée.

S.C. 13C. — *Appareils de Mesure Electroniques*

Président : M. J. L. LEISTRA (Pays-Bas).

Secrétariat : Hongrie.

Dernière réunion : Budapest, 1963.

Projet approuvé pour diffusion :

Recommandations pour les voltmètres électroniques.

Questions à l'étude :

— Recommandations pour les générateurs à usage de mesure à haute fréquence et à modulation d'amplitude.

— Recommandations pour les prescriptions des générateurs à usage de mesure à haute fréquence (G.T. 1).

- Recommandations pour les oscillographes à rayons cathodiques.
- Circuits d'alimentation stabilisés.
- Questions générales : Un Groupe de Travail s'occupe des questions d'intérêt commun pour tous les appareils de mesure électroniques, par exemple la préparation d'une brochure d'instructions.

Prochaine réunion : Date non encore fixée.

G.E. 24. — *Grandeurs et Unités Electriques et Magnétiques*

Président : D^r Carl C. CHAMBERS (Etats-Unis).

Secrétariat : France (M. Ch. DIETSCH).

Dernière réunion : Bucarest, 1962.

Publication en cours d'impression :

164 (1^{re} édition) — Recommandations de la C.E.I. dans le domaine des grandeurs et unités utilisées en électricité.

Questions à l'étude :

- Recommandation relative à la dénomination des grandeurs caractérisant les propriétés magnétiques et électriques du vide et d'une substance.
- Attribution du nom « lenz » à l'unité SI du champ magnétique dans le système des équations rationalisées du champ électromagnétique.
- Conventions concernant les circuits électriques et magnétiques.
- Définitions des grandeurs « courant magnétique » et « densité de courant magnétique ».
- Définitions de la grandeur « champ magnétique ».
- Unités d'induction magnétique et de flux magnétique.
- Rationalisation des équations du champ électromagnétique.

Prochaine réunion : Aix-les-Bains, 1964.

C.E. 25. — *Symboles Littéraires et Signes*

Président : M. M. K. LANDOLT (Suisse).

Secrétariat : Etats-Unis (D^r J. G. BRAINERD).

Dernière réunion : Bucarest 1962.

Projet diffusé :

25 (B.C.) 11 — Révision de la Publication 27 : Symboles littéraux à utiliser en électrotechnique.

Questions à l'étude :

- Symboles pour des grandeurs variables avec le temps.
- Symboles pour les fonctions discontinues
- Symboles littéraux proposés par divers Comités d'Etudes de la C.E.I.
- Symboles littéraux pour les télécommunications et l'électronique.
- Symboles littéraux pour les convertisseurs statiques.
- Utilisation d'un même symbole pour une grandeur physique et pour le rapport (sans dimension) de cette grandeur à une valeur « de référence » ou à toute autre valeur arbitraire de la grandeur considérée.

Prochaine réunion : Aix-les-Bains, 1964.

C.E. 39. — *Tubes Electroniques*

Président : M. H. LEWIS (Royaume-Uni)

Secrétariat : Pays-Bas.

Dernière réunion : Nice, 1962.

Nouveau Président :

M. E. CHARLTON FRY (Royaume-Uni) ayant démissionné, M. H. LEWIS (Royaume-Uni) a été nommé Président de C.E. 39 par le Comité d'Action.

Publication parue :

Sixième supplément à la Publication 67 : Dimensions de tubes électroniques.

Publications en cours d'impression :

151-1 (1^{re} édition) — Mesures des caractéristiques électriques des tubes électroniques — 1^{re} partie : Mesure du courant d'électrode.

151-2 (1^{re} édition) — 2^e partie : Mesure du courant de chauffage.

151-3 (1^{re} édition) — 3^e partie : Mesure des admittances équivalentes d'entrée et de sortie.

151-4 (1^{re} édition) — 4^e partie : Méthodes de mesure du facteur de bruit.

151-5 (1^{re} édition) — 5^e partie : Méthodes de mesure du souffle et du ronflement.

151-6 (1^{re} édition) — 6^e partie : Méthodes d'application des chocs mécaniques (impulsions).

151-7 (1^{re} édition) — 7^e partie : Méthodes de mesure de la résistance équivalente de bruit.

Projets approuvés pour publication :

— Additions et modifications à la Publication 67-39 (B.C.) 121.

— Mesure des temps de chauffage de la cathode et du filament —39 (B.C.) 125.

Projets diffusés :

39 (B.C.) 129 — Recommandations concernant les méthodes de mesure des tubes électroniques.

39 (B.C.) 133 — Méthode de mesure de l'émission parasite et des claquages dans les tubes-image de télévision.

39 (B.C.) 134 — Propositions de révision des recommandations de la C.E.I. pour la préparation des dessins des tubes électroniques.

39 (B.C.) 135 — Interconversion des pouces en millimètres et règles d'arrondissement.

39 (B.C.) 136 — Méthodes de mesure de l'impédance d'interface de cathode des tubes électroniques.

39 (B.C.) 137 — Méthodes de mesure de la puissance en audio-fréquence et de la distorsion des tubes électroniques.

39 (B.C.) 138 — Méthodes de mesure de la puissance de sortie en radio-fréquence des tubes électroniques.

39 (B.C.) 139 — Conditions générales de mesure des tubes à micro-ondes.

30 (B.C.) 410 — Terminologie et définitions générales relatives aux tubes pour hyperfréquences.

30 (B.C.) 141 — Méthodes de mesure de la résistance d'électrode, de la transconductance, du facteur d'amplification, de la résistance de conversion et de la pente de conversion.

- 39 (B.C.) 142 — Additions et modifications à la Publication 67 —
Première partie : Embases et culots.
- 39 (B.C.) 143 — Additions et modifications à la Publication 67 —
— Deuxième et troisième parties : Formes et coiffes.
- 39 (B.C.) 144 — Méthodes de mesure du courant d'émission des
tubes électroniques à vide, à cathode chaude.

Questions à l'étude :

- Tubes pour hyperfréquences :
- Méthodes de mesure des magnétrons.
 - Méthodes de mesure pour tubes à disques scellés.
 - Méthodes de mesure des tubes à ondes progressives.
 - Symboles, signes et abréviations.
- Méthodes de mesure :
- Effets mécaniques et acoustiques du bruit dans les tubes électroniques.
 - Courants d'électrodes parasites et non désirés.
 - Tubes à gaz, à l'exception des tubes à cathode à mercure.
 - Additions à la Publication 100 : Méthodes de mesure des capacités entre électrodes des tubes électroniques.
 - Tubes à rayons cathodiques pour radars et oscillographes.
- Emploi du terme anglais « rating ».
- Désignation des électrodes à déflexion électrostatiques des tubes à rayons cathodiques.

Prochaine réunion : Aix-les-Bains, 1964.

C.E. 46 — *Câbles, fils et guides d'ondes pour Equipements
de Télécommunications*

Président : Prof. Dr W. DRUEY (Suisse).

Secrétariat : Allemagne (M. H. PETERS).

Dernière réunion : Bucarest, 1962.

Publications en cours d'impression :

- 153-1 (1^{re} édition) — Guides d'ondes métalliques creux : 1^{re} partie —
Prescriptions générales et méthodes de mesure.
- 153-2 (1^{re} édition) — 2^e partie — Spécifications particulières pour
les guides d'ondes rectangulaires normaux.

153-3 (1^{re} édition) — 3^e partie — Spécifications particulières pour les guides d'ondes rectangulaires plats.

153-4 (1^{re} édition) — 4^e partie — Spécifications particulières pour les guides d'ondes circulaires.

154-1 (1^{re} édition) — Brides pour guides d'ondes — 1^{re} partie — Prescriptions générales et méthodes de mesure.

159 (1^{re} édition) — Dimensions des éléments d'accouplement des connecteurs coaxiaux pour fréquences radioélectriques.

Prochaine réunion : Aix-les-Bains 1964.

S.C. 46B. — *Guides d'Ondes et Dispositifs Accessoires*

Président : Dr B. JOSEPHSON (Suède).

Secrétariat : Etats-Unis (M. TORE, N. ANDERSON).

Dernière réunion : Bucarest, 1962.

Projets diffusés :

46B (B.C.) 6 — Recommandations pour des types additionnels de guides d'ondes rectangulaires plats de rapport 1 : 4.

46B (B.C.) 7 — Recommandations concernant une série de guides d'ondes rectangulaires de section extérieure circulaire (guides d'ondes millimétriques de précision).

Questions à l'étude :

Guides d'ondes rectangulaires souples.

Méthodes de mesure des pertes électriques, de l'affaiblissement, des rugosités de surface.

Prochaine réunion : Date non encore fixée.

C.E. 47. — *Dispositifs à Semiconducteurs*

Président : M. V. M. GRAHAM (Etats-Unis).

Secrétariat : France (M. J. GASHI).

Dernière réunion : Bad Kreuznach, 1963.

Publications parues :

147-1 (1^{re} édition) — Valeurs limites et caractéristiques essentielles des dispositifs à semiconducteurs et principes généraux des méthodes de mesure — Première partie : Valeurs limites et caractéristiques essentielles.

- 147-1A (1^{re} édition) — Complément à la Publication 147-1.
147-2 (1^{re} édition) — Deuxième partie : Principes généraux des méthodes de mesure.
148 (1^{re} édition) — Symboles littéraux pour les dispositifs à semi-conducteurs.

Projets approuvés pour publication :

Nomenclature et définitions pour dispositifs à semiconducteurs — 47 (B.C.) 10 et 47 (B.C.) 25.

Projets diffusés :

- 47 (B.C.) 29 — Valeurs limites et caractéristiques essentielles.
47 (B.C.) 30 — Valeurs limites et caractéristiques essentielles.
47 (B.C.) 31 — Valeurs limites et caractéristiques essentielles — Transistors de commutation.
47 (B.C.) 32 — Principes généraux des méthodes de mesure des dispositifs à semiconducteurs — Diodes pour petits signaux de faible puissance.
47 (B.C.) 33 — Principes généraux des méthodes de mesure des dispositifs à semiconducteurs — Transistors (suite).
47 (B.C.) 34 — Principes généraux des méthodes de mesure des dispositifs à semiconducteurs — Transistors (suite).
47 (B.C.) 35 — Principes généraux des méthodes de mesure des dispositifs à semiconducteurs — Transistors (suite) — Paramètres transitoires de commutation.
47 (B.C.) 36 — Valeurs limites et caractéristiques essentielles — Diodes de redressement.
47 (B.C.) 37 — Principes généraux des méthodes de mesure des dispositifs à semiconducteurs — Diodes de redressement.

Projet à diffuser :

Nomenclature et définitions :

- Termes et définitions pour les diodes pour signaux de faible puissance et les transistors.
- Termes et définitions pour les diodes tunnel.
- Termes et définitions pour les thyristors.

Valeurs limites et caractéristiques essentielles :

- Caractéristiques additionnelles pour les diodes pour signaux de faible puissance.

- Diodes tunnel.
- Diodes à capacité variable.
- Thyristors.

Méthodes de mesure :

- Diodes pour signaux de faible puissance.
- Transistors — Caractéristiques de bruit.
- Thyristors.

Normalisation mécanique :

- Recommandations concernant la préparation des dessins des dispositifs à semiconducteurs.
- Dimensions des dispositifs à semiconducteurs.
- Système de codification pour les encombrements et les embases des dispositifs à semiconducteurs.

Questions à l'étude :

Nomenclature, Définitions, Symboles littéraux :

- Création d'un glossaire qui devra être inclus dans la Publication 147.
- Termes et définitions pour les différents cas de tension de claquage en montage émetteur commun.
- Termes et définitions pour les thyristors.
- Termes et définitions pour la microélectronique.

Méthodes de mesure :

- Méthodes de mesure de référence des semiconducteurs.
- Conditions thermiques des mesures électriques de référence des dispositifs à semiconducteurs.
- Mesure de la tension de claquage collecteur-émetteur des transistors.

Paramètres du circuit équivalent hybride en π :

- Paramètres haute fréquence des transistors.
- Méthodes de mesure pour thyristors.
- Méthodes de mesure des diodes tunnel.
- Méthodes de mesure des diodes à capacité variable.

Sujets pour travaux futurs :

- Symboles littéraux des diodes tunnel.

— Dispositifs à effet Hall.

— Microélectronique.

Prochaine réunion : Philadelphie, 1964.

C.E. 53. — *Calculateurs et Traitement de l'Information*

Président : D^r A. B. CREDLE (Etats-Unis).

Secrétariat : Etats-Unis (M. V. M. GRAHAM).

Dernière réunion : Copenhague, 1963.

Liaison avec l'I.S.O. :

La liaison est maintenue avec les Comités I.S.O./T.C. 97 : Calculateurs et traitement de l'information, et I.S.O./T.C. 95 : Machine de bureau, par l'intermédiaire d'un Comité Directeur.

La dernière réunion de ce Comité Directeur s'est tenue à Paris en octobre 1962 ; la prochaine réunion se tiendra en février 1964.

Prochaine réunion : 1965.

Comité International Spécial des Perturbations Radioélectriques
(C.I.S.P.R.)

Président : Prof. L. MORREN (Belgique).

Secrétariat : Royaume-Uni.

Dernière session plénière : Philadelphie, 1961.

Le compte rendu de cette session (R.I. 15) est en cours d'impression.

Réunions de Groupes de Travail du C.I.S.P.R.

Les Groupes de Travail ci-après se sont réunis à Lausanne du 16 au 26 avril 1963 :

G.T. 1 — Appareillage de mesure des perturbations radioélectriques.

G.T. 2 — Perturbations produites par les équipements industriels, scientifiques et médicaux.

G.T. 3 — Perturbations produites par les lignes de transport et de distribution.

G.T. 5 — Caractéristiques des récepteurs de radiodiffusion relatives aux perturbations.

G.T. 6 — Perturbations produites par les moteurs, les appareils électrodomestiques, les appareils d'éclairage électrique et les appareils analogues.

G.T. 8 — Méthode d'échantillonnage et corrélation entre les effets perturbateurs et les valeurs mesurées.

Le Comité Directeur du C.I.S.P.R. s'est également réuni à Lausanne le 27 avril 1963.

Les Groupes de Travail 1, 2, 5 et 6, ainsi que le .T. 4 : Perturbations produites par les dispositifs d'allumage des moteurs, et le Comité Directeur du C.I.S.P.R. se réuniront à Londres en février 1964.

Prochaine session plénière : Stockholm, 1964.

6. — PUBLICATIONS

Publications parues :

N°	Titre	Comité d'Etudes responsable	Date de parution
67	Dimensions des tubes électroniques — Sixième supplément	C.E. 39	Mars 1963
147-1	Valeurs limites et caractéristiques essentielles des dispositifs à semi-conducteurs et principes généraux des méthodes de mesures — Première partie : Valeurs limites et caractéristiques essentielles	C.E. 47	Août 1963
147-1A	Complément à la Publication 147-1 (1963) — Valeurs limites et caractéristiques essentielles des dispositifs à semiconducteurs et principes généraux des méthodes de mesure — Première partie : Valeurs limites et caractéristiques essentielles	C.E. 47	Octobre 1963
147-2	Valeurs limites et caractéristiques essentielles des dispositifs à semi-conducteurs et principes généraux des méthodes de mesure — Deuxième partie : Principes généraux des méthodes de mesure	C.E. 47	Août 1963
148	Symboles littéraux pour les dispositifs à semiconducteurs	C.E. 47	Juillet 1963
160	Conditions atmosphériques normales pour les essais et les mesures	C.A.	Novembre 1963

Publications en cours d'impression

N°	Titre	Comité d'Etudes responsable
117-6	Symboles graphiques recommandés — Sixième partie : Variabilités, exemples de résistances, éléments de tubes électroniques, soupapes et redresseurs (première édition)	C.E. 3
146*	Cellules, éléments, assemblages et groupes redresseurs semiconducteurs monocristallins (première édition)	C.E. 22
149-1*	Supports de tubes électroniques — Première partie : Prescriptions générales et méthodes d'essai (première édition)	S.C. 39/48
151-1*	Mesures des caractéristiques électriques des tubes électroniques — Première partie : Mesure du courant d'électrode (première édition)	C.E. 39
151-2*	Mesures des caractéristiques électriques des tubes électroniques — Deuxième partie : Mesure du courant de chauffage (première édition)	C.E. 39
151-3*	Mesures des caractéristiques électriques des tubes électroniques — 3 ^e partie : Mesure des admittances équivalentes d'entrée et de sortie (première édition)	C.E. 39
151-4*	Mesures des caractéristiques électriques des tubes électroniques — 4 ^e partie : Méthodes de mesure du facteur de bruit (première édition)	C.E. 39
151-5	Mesures des caractéristiques électriques des tubes électroniques — 5 ^e partie : Méthodes de mesure du souffle et du ronflement (première édition)	C.E. 39

* Maintenant parue.

N°	Titre	Comité d'Etudes responsable
151-6	Mesures des caractéristiques électriques des tubes électroniques — 6 ^e partie : Méthodes d'application des chocs mécaniques (impulsions) (première édition)	C.E. 39
151-7	Mesures des caractéristiques électriques des tubes électroniques — 7 ^e partie : Méthodes de mesure de la résistance équivalente de bruit (première édition)	
153-1*	Guides d'ondes métalliques creux — Première partie : Prescriptions générales et méthodes de mesure (première édition)	C.E. 46
153-2	Guides d'ondes métalliques creux — Deuxième partie : Spécifications particulières pour les guides d'ondes rectangulaires normaux (première édition)	C.E. 46
153-3	Guides d'ondes métalliques creux — Troisième partie : Spécifications particulières pour les guides d'ondes rectangulaires plats (première édition)	C.E. 46
153-4	Guides d'ondes métalliques creux — Quatrième partie : Spécifications particulières pour les guides d'ondes circulaires (première édition)	C.E. 46
154-1	Brides pour guides d'ondes — Première partie : Prescriptions générales et méthodes de mesure (première édition)	C.E. 46
159	Connecteurs pour fréquences radioélectriques — Dimensions des éléments d'accouplement (première édition)	C.E. 46
R. I. 15	Rapport de la session plénière du C.I.S.P.R. tenue à Philadelphie du 2 au 6 octobre 1961	C.I.S.P.R.

* Maintenant parue.

7. — PROJETS DIFFUSÉS POUR APPROBATION

Les projets de recommandations ou de rapports, dont la liste suit, ont été diffusés pour approbation.

N° de référence	Titre	Date de diffusion
2 (B.C.) 426	Irrégularités de la forme d'onde (addition à la Publication 34-1 (1960))	28-2-1963
3 (B.C.) 462	Transducteurs et amplificateurs magnétiques	31-10-1963
3 (B.C.) 463	Exemples de tubes électroniques, soupapes et redresseurs	31-10-1963
39 (B.C.) 129	Méthodes de mesure des tubes électroniques	31-8-1963
39 (B.C.) 133	Méthode de mesure de l'émission parasite et des claquages dans les tubes-image de télévision	15-11-1963
39 (B.C.) 134	Révision des recommandations de la C.E.I. pour la préparation des dessins de tubes électroniques	15-11-1963
39 (B.C.) 135	Interconversion des pouces en millimètres et règles d'arrondissement	15-11-1963
39 (B.C.) 136	Méthodes de mesure de l'impédance d'interface de cathode des tubes électroniques	15-11-1963
39 (B.C.) 137	Méthodes de mesure de la puissance en audiofréquence et de la distorsion des tubes électroniques	15-11-1963
39 (B.C.) 138	Méthodes de mesure de la puissance de sortie en radiofréquence des tubes électroniques	15-11-1963
29 (B.C.) 139	Conditions générales de mesure des tubes à microondes	15-11-1963

N° de référence	Titre	Date de diffusion
39 (B.C.) 140	Terminologie et définitions générales relatives aux tubes pour hyperfréquences	15-11-1963
39 (B.C.) 141	Méthodes de mesure de la résistance d'électrode, de la transconductance, du facteur d'amplification, de la résistance de conversion et de la pente de conversion	15-12-1963
47 (B.C.) 29	Amendement à l'introduction de la Publication 147-1 : Valeurs limites et caractéristiques essentielles des dispositifs à semi-conducteurs et principes généraux des méthodes de mesure — Première partie : Valeurs limites et caractéristiques essentielles	15-8-1963
47 (B.C.) 30	Amendement au chapitre II : Transistors pour petits signaux de faible puissance, de la Publication 147-1	
47 (B.C.) 31	Valeurs limites et caractéristiques essentielles des dispositifs à semiconducteurs — Transistors de commutation	15-8-1963
47 (B.C.) 32	Principes généraux des méthodes de mesure des dispositifs à semiconducteurs — Diodes pour petits signaux de faible puissance	15-8-1963
47 (B.C.) 33	Principes généraux des méthodes de mesure des dispositifs à semiconducteurs — Transistors (suite) — Valeurs limites des tensions et caractéristiques mesurables limitant les tensions d'utilisation	15-8-1963
47 (B.C.) 34	Principes généraux des méthodes de mesure des dispositifs à semiconducteurs — Transistors (suite) — Résistance thermique	15-8-1963
47 (B.C.) 35	Principes généraux des méthodes de mesure des dispositifs à semiconducteurs — Transistors (suite) — Paramètres transitoires de commutation	15-8-1963

N° de référence	Titre	Date de diffusion
47 (B.C.) 36	Valeurs limites et caractéristiques essentielles des dispositifs à semiconducteurs — Diodes de redressement	15-8-1963
47 (B.C.) 37	Principes généraux des méthodes de mesure des dispositifs à semiconducteurs — Diodes de redressement	15-8-1963
49 (B.C.) 5	Modifications et suppléments à la Section quatre de la Publication 122 : Encombrements normaux des quartz pour oscillateurs	30-5-1963
49 (B.C.) 6	Proposition pour la correction de la feuille 2a de la Section quatre de la Publication 122 : Encombrements normaux des quartz pour oscillateurs	15-11-1963
51 (B.C.) 17	Dimensions de bâtonnets d'antennes en oxydes ferromagnétiques	31-12-1963
51 (B.C.) 18	Dimensions de tubes et petits bâtonnets en oxydes ferromagnétiques	31-12-1963
52 (B.C.) 3	Liste des termes et définitions concernant les circuits imprimés	31-8-1963
52 (B.C.) 4	Modification à la Publication 97 : Paramètres fondamentaux pour la technique des câblages imprimés	31-8-1963
02 (B.C.) 3	Modifications au 01 (B.C.) 340 : Rapport sur les conditions atmosphériques normales pour les essais et les mesures	15-2-1963
3 (B.C.) 464	Symboles pour dispositifs à semiconducteurs	15-11-1963
8 (B.C.) 1109	Fréquences normales de la C.E.I.	15-5-1963
29 (B.C.) 61	Modifications au 29 (B.C.) 45 : Méthodes de mesure pour les haut-parleurs	30-9-1963

N° de référence	Titre	Date de diffusion
48 (B.C.) 32	Modifications au 48 (B.C.) 15 : Connecteurs pour plaquettes de câblage imprimé — Paramètres fondamentaux	31-7-1963
50B (B.C.) 108	Modifications au 50B (B.C.) 104 : Essai Bb : Essai de chaleur sèche pour appareils électroniques	31-7-1963
50B (B.C.) 112	Modifications au 50B (B.C.) 102 : Essai Ab : Essai de froid pour appareils électroniques	31-10-1963

INTERNATIONAL ELECTROTECHNICAL COMMISSION (I. E. C.)

Central Office Report for 1963

The I.E.C. has just published the Central Office Report for 1963.
We are giving for information some abstracts of this report
which might be interesting for our readers.

COUNCIL

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NATIONAL COMMITTEES

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Czechoslovakia		United Arab Republic
Denmark	Netherlands	United Kingdom
Finland	Norway	United States of America
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Germany	Poland	Yugoslavia

FUTURE GENERAL MEETINGS

1964 — General Meeting to be held at Aix-les-Bains (France) from 19th to 30th May.

1965 — General Meeting to be held in Tokyo (Japan).

1966 — General Meeting — The Israel National Committee is considering the possibility of inviting the I.E.C. in 1966.

MEETINGS HELD IN 1963

Title	Place	Month	R.M.
Nomenclature	Brussels	September	817
Graphical symbols	Venice	June	772
Radio-communication	Venice	June	777
Radio receiving equipment ..	The Hague	February	269
	Venice	May	778
Radio transmitting equipment	Venice	May/June	780
Measuring instruments	Budapest	September	804
Integrating meters	Budapest	September	805
Indicating instruments	Budapest	September	806
Electronic measuring instruments	Budapest	September	807
Insulating materials	Venice	May	781
Semiconductor convertors ...	Montreux	September	813
Capacitors and resistors for electronic equipment	Venice	May	798
Electrical measuring instruments used in connection with ionizing radiation	Venice	May/June	801
Semiconductor devices	Bad Kreuznach	October	821
Piezo-electric crystals and associated devices	Venice	June	802
Computers and information processing	Copenhagen	September	808
Digital data transmission	Copenhagen	September	810

TECHNICAL COMMITTEES

T.C. 1. — *Nomenclature*

Chairman : Mr. F. CAHEN (France).

Secretariat : France (Mr. Ch. DIETSCH).

Last meeting : Brussels, 1963.

Second edition of the International Electrotechnical Vocabulary

1. Groups published :

- 05 — Fundamental definitions (France).
- 07 — Electronics (France).
- 12 — Transducers (Sweden).
- 20 — Scientific and industrial measuring instruments (France).
- 62 — Waveguides (United Kingdom).

3. Groups for which the final text is being prepared for printing.

- 60 — Radiocommunications (United Kingdom).

5. Group for which a revised draft together with a supplement is to be circulated for approval under the Six Months'Rule.

- 66 — Detection and measurement of ionizing radiation by electric means (France).

7. — Alphabetical index.

This general alphabetical index is being prepared by the Spanish Electrotechnical Committee. The publication of an edition grouping all terms appearing in the already published groups of the second edition of the I.E.V. is planned for 1965.

Next meeting : Aix-les-Bains, 1964.

T.C. 3. — *Graphical Symbols*

Chairman : Mr. A. LANGE (France).

Secretariat : Switzerland (Mr. H. BENNINGER).

Last meeting : Venice, 1963.

Publications being printed :

- 117-6 (1st edition) — Part 6 : Variability, examples of resistors, elements of electronic tubes, valves and rectifiers.

Document circulated :

- 3 (C.O.) 464 — Revision of 3 (C.O.) 456 — Symbols for semiconductor devices.

Drafts circulated :

- 3 (C.O.) 462 — Transducers and magnetic amplifiers.

3 (C.O.) 463 — Examples of electronic tubes, valves and rectifiers.

Subjects under consideration :

- Further examples of symbols for electronic tubes and valves.
- Elements of microwave tubes (Working Group 1).
- Electronic computers (Working Group 2).
- C.C.I./I.E.C. Joint Working Group on Graphical Symbols for Telecommunications : This group held three meetings during 1963.

Other question :

Recommended symbols with regard to terminal devices and controls for radio-communication equipment and electronic devices employing similar devices — To be dealt with by a Working Group of T.C. 12 on which the Secretariats of other interested Technical Committees (such as T.C. 3 and T.C. 29) will be invited to be represented.

Next meeting : Aix-les-Bains, 1964.

T.C. 12. — *Radio-communication*

Chairman : Mr. P. BESSON (France).

Secretariat : Netherlands.

Last meeting : Venice, 1963.

Publication being printed :

138A — Supplement to Publication 138 (1962) : Methods of measurement of essential electrical properties of receiving aerials in the frequency range from 30 MHz (Mc/s) to 1000 MHz (Mc/s).

Revised scope :

At its meeting in Venice in June 1963, the Committee of Action approved the following revised scope for T.C. 12 :

« To prepare international recommendations for equipment for radio-communication purposes and electronic devices employing similar techniques, except those explicitly dealt with by another Committee. According to the case, these recommendations give a list of characteristics, fix their standard values, describe the appropriate means of control and mea-

surement. They specify the requirements for personal safety and for fire prevention.»

Subject under consideration :

Recommended symbols with regard to terminal devices and controls for radio-communication equipment and electronic devices employing similar techniques.

Next meeting : Date not yet fixed.

S.C. 12A. — *Radio Receiving Equipment*

Chairman : Mr. S. A. C. PEDERSEN (Denmark).

Secretarial : Netherlands.

Last meetings : The Hague, 1963 ; Venice, 1963.

Subjects under consideration :

- Revision of Publication 69 (1954) — Recommended methods of measurement on receivers for amplitude-modulation broadcast transmissions — New drafts to be circulated for Part A : General, Part B : Audio-frequency measurements, Part C : Radio-frequency measurements for amplitude-modulation transmissions, Part X : Measurement of the susceptibility to impulsive interference of frequency-modulation receivers with a frequency range up to 300 MHz (Mc/s) and Part Y : Measurement of the susceptibility to interference of amplitude-modulation receivers in the frequency range of 150 kHz (kc/s) to 1605 kHz (kc/s). A supplement to Part Y to extend the frequency range to 30 MHz (Mc/s) is also to be prepared.
- Aerials — Cross polarization, circular polarization, feeder pick-up, bandwidth devices for producing standard field measurements on a.m. aerials, measurement on complete systems, various types of artificial aerials.
- Supplement to Publication 107 (1960) — Recommended methods of measurement on receivers for television broadcast transmissions, concerning automatic control.
- Radiation measurements (W.G. 1) — Analytical methods of indoor radiation measurements in the frequency range between 30 MHz (Mc/s), correlation between various methods of measurement, r.f. anechoic rooms, artificial mains network, measurement of time-base radiation at the aerial terminals, measu-

rement of intermediate frequency radiation at higher frequencies than envisaged in Publication 106A, combined radio and television receivers, systems using sub-carriers.

- Susceptibility to interference (W.G. 2) — Susceptibility of f. m. receivers to interference other than that produced by motor cars, determination of the load network for aerial and earth for receivers with impedance from certified source, susceptibility of television receivers to interference.
- Community aerial systems — A new Working Group (W.G. 3) has been set up to deal with all problems raised by this question.
- Professional receivers.
- Magnetic field generators for a frequency range up to 30 MHz (Mc/s).
- Stereophony.

Next meeting : Date not yet fixed.

S.C. 12B. — *Safety*

Chairman : Mr. P. D. POPPE (Norway).

Secretariat : Netherlands.

Last meeting : Venice, 1963.

Document circulated

12B (C.O.) 28 — Amendments to 12B (C.O.) 25 — Safety requirements for mains operated electronic and related equipment for domestic and similar use.

Subjects under consideration :

- Further study of the problem of permissible temperature rises, taking also into account fire risks.
- Supplementary requirements for printed wiring (in co-operation with T.C. 52).

Other questions to be considered (subject to the approval of the National Committees) :

- Supplementary requirements for tropical conditions (possibly in combination with supplementary requirements for drip and splash test equipment).

- More specific requirements for the use of impregnated wood as insulating material.
- Detailed requirements for a test of insulating layers on the interior of metal enclosures.
- Requirements for professional radio-receivers.
- Requirements for battery operated equipment with alternative mains supply.

Next meeting : Date not yet fixed.

S.C. 12C. — *Radio Transmitting Equipment*

Chairman : Mr. C. BEURTHÉRET (France).

Secretariat : Netherlands.

Last meeting : Venice, 1963.

Drafts approved for publication :

Safety requirements for radio-transmitting equipment :

Part 1 : Requirements — 12C (C.O.) 5.

Part 2 : Test methods — 12C (C.O.) 6.

Drafts approved for circulation :

Methods of measurement for radio-transmitters :

Part 1 : General.

Part 2 : Power consumption, total power factor and overall efficiency.

Part 3 : Output power measurements.

Part 4 : Output power radio-frequency characteristics.

Part 5 : Frequency measurements.

Subjects under consideration :

— Methods of measurement for radio-transmitters (W.G. 2) :

Part 6 : Bandwidth measurements, power on out-of-band frequencies and on non-essential frequencies.

Part 7 : Modulation measurements.

Part 8 : Distortion measurements.

Part 9 : Measurements of television transmitter properties.

— Standardized descriptive leaflet and standardized rating plaet for radio-transmitting equipment (W.G. 2).

- Revision of the publications on safety requirements for radio-transmitting equipment (W.G. 1).
- Document concerning the rules of behaviour of skilled personnel (W.G. 1), in liaison with the International Telecommunication Union (I.T.U.).

Future work :

Methods of measurement for aerials and aerial systems.

Next meeting : Date not yet fixed.

S.C. 13C. — *Electronic Measuring Instruments*

Chairman : Mr. J. L. LEISTRA (Netherlands).

Secretariat : Hungary.

Last meeting : Budapest, 1963.

Draft approved for circulation under the Six Months' Rule :
Recommendations for electronic voltmeters.

Subjects under consideration :

- Recommendations for amplitude modulated radio-frequency signal generators (W.G. 1).
- Recommendations for specification of radio-frequency signal generators (W.G. 1).
- Recommendations for cathode-ray oscilloscopes (W.G. 3).
- Stabilized power supplies (W.G. 6 in liaison with T.C. 45).
- General questions — Work on questions common to all electronic measuring instruments, such as preparation of instruction booklets, is continuing in a Working Group (W.G. 5).

Next meeting : Date not yet fixed.

T.C. 24 — *Electric and Magnetic Quantities and Units*

Chairman : Dr. Carl C. CHAMBER (U. S. A.).

Secretariat : France (Mr. Ch. DIETSCH).

Last meeting : Bucharest, 1962.

Publication being printed :

164 (1st edition) — 1 E.C. Recommendations in the field of quantities and units used in electricity.

Subjects under consideration :

- Recommendation concerning the designation of the quantities characterizing the magnetic and electric properties of vacuum and a substance.
- Assignment of the name « lenz » to the S I unit of magnetic field strength in the rationalized electromagnetic field equations.
- Electric and magnetic circuit conventions.
- Definition of the quantities « magnetic current » and « magnetic current density ».
- Definition of the quantity « magnetic field ».
- Units of magnetic induction and of magnetic flux.
- Rationalization of the electro-magnetic field equations.

Next meeting : Aix-les Bains, 1964.

T.C. 25 — *Letter Symbols and Signs*

Chairman : Mr. M. K. LANDOLT (Switzerland).

Secretariat : U. S. A. (Dr. J. G. BRAINERD).

Last meeting : Bucharest, 1962.

Draft circulated :

25 (C.O.) 11 — Revision of Publication 27 : Letter symbols to be used in electrical technology.

Subjects under consideration :

- Symbols for quantities varying with time.
- Symbols for singularity functions.
- Letter symbols proposed for use by various I.E.C. Technical Committees (W.G. 1).
- Letter symbols for telecommunications and electronics (W.G. 2).
- Letter symbols for static convertors (W.G. 3).
- Use of the same symbol for a physical quantity and for the (dimensionless) ratio of that quantity to a « reference » or other agreed-upon value of the same quantity.

Next meeting : Aix-les-Bains, 1964.

T.C. 39. — *Electronic Tubes and Valves*

Chairman : Mr. H. LEWIS (United Kingdom).

Secretariat : Netherlands.

Last meeting : Nice, 1962.

New Chairman :

Following the resignation of Mr. E. Charlton FRY (United Kingdom), Mr. H. LEWIS (United Kingdom) was appointed Chairman of T.C. 39 by the Committee of Action.

Publication issued :

Sixth supplement to Publication 67 : Dimensions of electronic tubes and valves.

Publications being printed :

151-1 (1st edition) — Measurements of the electrical properties of electronic tubes and valves — Part 1 : Measurement of electrode current.

151-2 (1st edition) — Part 2 : Measurement of heater or filament current.

151-3 (1st edition) — Part 3 : Measurement of equivalent input and output admittances.

151-4 (1st edition) — Part 4 : Methods of measuring noise factor.

151-5 (1st edition) — Part 5 : Methods of measuring hiss and hum.

151-6 (1st edition) — Part 6 : Methods of application of mechanical shock (impulse) excitation.

151-7 (1st edition) — Part 7 : Methods of measuring equivalent noise resistance.

Drafts approved for publication :

— Addenda and amendments to Publication 67-39 (C.O.) 121.

— Measurement of cathode heating time and heater warm-up time — 39 (C.O.) 125.

Drafts circulated :

39 (C.O.) 129 — Recommendations on methods of measurement of electronic tubes and valves.

39 (C.O.) 133 — Measuring method of stray emission and flash-over in television picture tubes.

- 39 (C.O.) 134 — Proposals for the future revision of I.E.C. recommended practice for the preparation of drawings of electronic tubes and valves.
- 39 (C.O.) 135 — Inter-conversion and rounding-off of inch and millimetre dimensions.
- 39 (C.O.) 136 — Methods of measuring the cathode-interface impedance of electronic tubes and valves.
- 39 (C.O.) 137 — Methods of measurement of audio-frequency output power and distortion of electronic tubes and valves.
- 39 (C.O.) 138 — Methods of measurement of radio-frequency output power of electronic tubes and valves.
- 39 (C.O.) 139 — General measurement requirements for microwave tubes and valves.
- 39 (C.O.) 140 — General terms and definitions relating to microwave tubes and valves.
- 39 (C.O.) 141 — Methods of measuring electrode resistance, transconductance amplification factor, conversion resistance and conversion transconductance.
- 39 (C.O.) 142 — Addenda and amendments to Publication 67 — Part I : Bases and gauges.
- 39 (C.O.) 143 — Addenda and amendments to Publication 67 — Parts II and III : Outlines and caps.
- 39 (C.O.) 144 — Methods of measurement of emission current from hot cathodes for high-vacuum electronic tubes and valves.

Subjects under consideration :

- Microwave tubes and valves :
 - Method of measurement of magnetrons.
 - Measuring methods for disk-seal tubes and valves.
 - Measuring methods for travelling-wave tubes.
 - Letter symbols, signs and abbreviations.
- Measuring methods :
 - Mechanical and acoustic noise effects in electronic tubes and valves.
 - Television picture tubes.
 - Spurious and unwanted electrode currents.

- Gas tubes, excluding pool tubes.
 - Addition to Publication 100 : Methods for the measurement of inter-electrode capacitances of electronic tubes and valves.
 - Radar and oscilloscope cathode-ray tubes.
 - Use of the English term « rating ».
 - Designation of electrostatic deflection electrodes of cathode-ray tubes.
- Next meeting : Aix-les-Bains, 1964.

T.C. 46 — *Cables, Wires and Waveguides for Telecommunication Equipment*

Chairman : Prof. Dr. W. DRUEY (Switzerland).
Secretariat : Germany (Mr. H. PETERS).

Last meeting : Bucharest, 1962.

Publications being printed :

- 153-1 (1st edition) — Hollow metallic waveguides — Part 1 — General requirements and measuring methods.
- 153-2 (1st edition) — Part 2 — Relevant specifications for ordinary rectangular waveguides.
- 153-3 (1st edition) — Part 3 — Relevant specifications for flat rectangular waveguides.
- 153-4 (1st edition) — Part 4 — Relevant specifications for circular waveguides.
- 154-1 (1st edition) — Flanges for waveguides — Part 1 — General requirements and measuring methods.
- 159 (1st edition) — Dimensions of the mating parts of r.f. coaxial connectors.

Next meeting : Aix-les-Bains, 1964.

S.C. 46B. — *Waveguides and their Accessories*

Chairman : Dr. B. JOSEPHSON (Sweden).
Secretariat : U. S. A. (Mr. TORE, N. ANDERSON).

Last meeting : Bucharest, 1962.

Drafts circulated :

46B (C.O.) 6 — Recommendations for additional sizes of rectangular waveguides having a 1 : 4 aspect ratio.

46B (C.O.) 7 — Recommendations for a series of rectangular waveguides with circular outside cross-section (precision millimetre waveguides).

Subjects under consideration :

— Rectangular flexible waveguides.

— Measuring methods for electrical leakage, attenuation, surface roughness.

Next meeting : Date not yet fixed.

T.C. 47. — *Semiconductor Devices*

Chairman : Mr. V. M. GRAHAM (U. S. A.).

Secretarial : France (Mr. J. GASCHI).

Last meeting : Bad Kreuznach, 1963.

Publications issued :

147-1 (1st edition) — Essential ratings and characteristics of semiconductor devices and general principles of measuring methods — Part 1 : Essential ratings and characteristics.

147-1A (1st edition) — Supplement to Publication 147-1.

147-2 (1st edition) — Part 2 : General principles of measuring methods.

148 (1st edition) — Letter symbols for semiconductor devices.

Drafts approved for publication :

Nomenclature and definitions for semiconductor devices — 47 (C.O.) 10 and 47 (C.O.) 25.

Drafts circulated under the Six Months' Rule :

47 (C.O.) 29 — Essential ratings and characteristics.

47 (C.O.) 30 — Essential ratings and characteristics.

47 (C.O.) 31 — Essential ratings and characteristics — Switching transistors.

47 (C.O.) 32 — General principles of measuring methods of semiconductor devices — Low-power small-signal diodes.

- 47 (C.O.) 33 — General principles of measuring methods of semiconductor devices — Transistors (continuation).
- 47 (C.O.) 34 — General principles of measuring methods of semiconductor devices — Transistors (continuation).
- 47 (C.O.) 35 — General principles of measuring methods of semiconductor devices — Transistors (continuation) — Transient switching parameters.
- 47 (C.O.) 36 — Essential ratings and characteristics — Rectifier diodes.
- 47 (C.O.) 37 — General principles of measuring methods of semiconductor devices — Rectifier diodes.

Drafts to be circulated under the Six Month's Rule :

Nomenclature and definitions :

- Terms and definitions for low-power signal diodes and transistors.
- Terms and definitions for tunnel diodes.
- Terms and definitions for thyristors.

Essential ratings and characteristics :

- Additional characteristics for low-power signal diodes.
- Tunnel diodes.
- Variable capacitance diodes.
- Thyristors.

Measuring methods :

- Low-power signal diodes.
- Transistors — Noise characteristics.
- Thyristors.

Mechanical standardization :

- Recommended practice for the preparation of drawings of semiconductor devices.
- Dimensions of semiconductor devices.
- Coding system for outlines and bases of semiconductor devices.

Subjects under consideration :

Nomenclature, Definitions, Letter symbols :

- Creation of a glossary to be included in Publication 147.

- Terms and definitions for the various cases of common emitter breakdown voltage.
- Terms and definitions for thyristors.
- Terms and definitions for microelectronics.

Measuring methods :

- Reference measuring methods of semiconductor devices.
- Thermal conditions for electrical reference measurements of semiconductor devices.
- Measurement of the collector-emitter breakdown voltage of transistors.
- Hybrid π equivalent circuit parameters.
- High-frequency parameters of transistors.
- Measuring methods of thyristors.
- Measuring methods of tunnel diodes.
- Measuring methods of variable capacitance diodes.

Subjects for future work :

- Letter symbols for tunnel diodes.
- Hall effect devices.
- Microelectronics.

Next meeting : Philadelphia, 1964.

T.C. 53. — *Computers and Information Processing*

Chairman : Dr. A. B. CREDLE (U. S. A.).

Secretarial : U. S. A. (Mr. V. M. GRAHAM).

Last meeting : Copenhagen, 1963.

Liaison with I.S.O. :

Liaison with I.S.O./T.C. 97, Computers and information processing, and I.S.O./T.C. 95, Office machines, is maintained through a Joint Steering Committee.

This Joint Steering Committee last met in Paris in October 1962; its next meeting will be held in February 1964.

Next meeting : 1965.

International Special Committee on Radio Interference
(C.I.S.P.R.)

Chairman : Prof. L. MORREN (Belgium).

Secretariat : United Kingdom.

Last plenary session : Philadelphia, 1961.

The report of this session R.I. 15 is being printed.

Meetings of C.I.S.P.R. Working Groups :

Meetings of the following Working Groups were held in Lausanne from 16th to 26th April 1963 :

W.G. 1 — Interference measuring equipment.

W.G. 2 — Interference from I.S.M. apparatus.

W.G. 3 — Interference from power mines.

W.G. 5 — Interference characteristics of radio receivers.

W.G. 6 — Interference from motors, domestic appliances, lighting apparatus and the like.

W.G. 8 — Sampling methods and correlation between measured value and disturbing effect.

The C.I.S.P.R. Steering Committee also met in Lausanne on 27th April, 1963.

Meetings of C.I.S.P.R. Working Groups 1, 2, 5 and 6 as well as W.G. 4, Interference from ignition systems, and the C.I.S.P.R. Steering Committee will be held in London in February 1964.

Next plenary session : Stockholm, 1964.

6. — PUBLICATIONS

Publications issued

No.	Title	Technical Committee responsible	Date of issue
67	Dimensions of electronic tubes and valves — Sixth supplement	T.C. 39	March 1963
147-1	Essential ratings and characteristics of semiconductor devices and general principles of measuring methods — Part : Essential ratings and characteristics	T.C. 47	August 1963
147-1A	Supplement to Publication 147-1 (1963) — Essential ratings and characteristics of semiconductor devices and general principles of measuring methods — Part 1 : Essential ratings and characteristics	T.C. 47	October 1963
147-2	Essential ratings and characteristics of semiconductor devices and general principles of measuring methods — Part 2 : General principles of measuring methods	T.C. 47	August 1963
148	Letter symbols for semiconductor devices	T.C. 47	July 1963
160	Standard atmospheric conditions for test purposes	C.A.	November 1963

Publications being Printed

No.	Title	Technical Committee responsible
117-6	Recommended graphical symbols — Part 6 : Variability, examples of resistors, elements of electronic tubes, valves and rectifiers (First edition)	T.C. 3
146*	Monocrystalline semiconductor rectifier cells, stacks, assemblies and equipments (First edition)	T.C. 22
149-1*	Sockets for electronic tubes and valves — Part 1 : General requirements and methods of test (First edition)	S.C. 39/48
151-1*	Measurements of the electrical properties of electronic tubes and valves — Part 1 : Measurement electrode current (First edition)	T.C. 39
151-2*	Measurements of the electrical properties of electronic tubes and valves — Part 2 : Measurement of heater or filament current (First edition)	T.C. 39
151-3*	Measurements of the electrical properties of electronic tubes and valves — Part 3 : Measurement of equivalent input and output admittances (First edition)	T.C. 39
151-4*	Measurements of the electrical properties of electronic tubes and valves — Part 4 : Methods of measuring noise factor (First edition)	T.C. 39
151-5	Measurements of the electrical properties of electronic tubes and valves — Part 5 : Methods of measuring hiss and hum (First edition)	T.C. 39
151-6	Measurements of the electrical properties of electronic tubes and valves — Part 6 : Methods of application of mechanical shock (impulse) excitation (First edition)	T.C. 39

* Now issued.

No.	Title	Technical Committee responsible
151-7	Measurements of the electrical properties of electronic tubes and valves — Part 7 : Methods of measuring equivalent noise resistance (First edition)	T.C. 39
153-1*	Hollow metallic waveguides — Part 1 : General requirements and measuring methods (First edition)	T.C. 46
153-2	Hollow metallic waveguides — Part 2 : Relevant specifications for ordinary rectangular waveguides (First edition)	T.C. 46
153-3	Hollow metallic waveguides — Part 3 : Relevant specifications for flat rectangular waveguides (First edition)	T.C. 46
153-4	Hollow metallic waveguides — Part 4 : Relevant specifications for circular waveguides (First edition)	T.C. 46
154-1	Flanges for waveguides — Part 1 : General requirements and measuring methods (First edition)	T.C. 46
159	Radio-frequency connectors — Dimensions of the mating parts (First edition)	T.C. 46
R.I. 15*	Report of the Plenary Session of the C.I.S.P.R. held in Philadelphia from 2nd to 6th October 1961	C.I.S.P.R.

* Now issued.

7. — DRAFTS SUBMITTED FOR APPROVAL

The following draft Recommendations or Reports were circulated for approval.

Reference No.	Title	Date of circulation
2 (C.O.) 426	Irregularities of waveform (addition to Publication 34-1 (1960))	28-2-1963
3 (C.O.) 462	Transducers and magnetic amplifiers	31-10-1963
3 (C.O.) 463	Examples for electronic tubes, valves and rectifiers	31-10-1963
39 (C.O.) 129	Methods of measurement of electronic tubes and valves	31-8-1963
39 (C.O.) 133	Measuring method of stray emission and flashover in television picture tubes	15-11-1963
39 (C.O.) 134	Revision of I.E.C. recommended practice for the preparation of drawings of electronic tubes and valves	15-11-1963
39 (C.O.) 135	Inter-conversion and rounding off of inch and millimetre dimensions	15-11-1963
39 (C.O.) 136	Methods of measuring the cathode-interface impedance of electronic tubes and valves	15-11-1963
39 (C.O.) 137	Methods of measurement of audio-frequency output power and distortion of electronic tubes and valves	15-11-1963
39 (C.O.) 138	Methods of measurement of radio-frequency output power of electronic tubes and valves	15-11-1963
39 (C.O.) 139	General measurement requirements for microwave tubes and valves	15-11-1963
39 (C.O.) 140	General terms and definitions relating to microwave tubes and valves	15-11-1963

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39 (C.O.) 141	Methods of measuring electrode resistance, transconductance, amplification factor, conversion resistance and conversion transconductance	15-12-1963
39 (C.O.) 142	Addenda and amendments to Publication 67 — Part 1 : Bases and gauges	15-12-1963
47 (C.O.) 29	Amendment to the introduction of Publication 147-1 : Essential ratings and characteristics of semiconductor devices and general principles of measuring methods — Part 1 : Essential ratings and characteristics	15-8-1963
47 (C.O.) 30	Amendment to Chapter II : Low-power small signal transistors, of Publication 147-1	15-8-1963
47 (C.O.) 31	Essential ratings and characteristics of semiconductor devices — Switching transistors	15-8-1963
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47 (C.O.) 34	General principles of measuring methods of semiconductor devices — Transistors (continuation) — Thermal resistance	15-8-1963
47 (C.O.) 35	General principles of measuring methods of semiconductor devices — Transistors (continuation) — Transient switching parameters	15-8-1963
47 (C.O.) 36	Essential ratings and characteristics of semiconductor devices — Rectifier diodes	15-8-1963

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47 (C.O.) 37	General principles of measuring methods of semiconductor devices — Rectifier diodes	15-8-1963
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51 (C.O.) 17	Dimensions of aerials rods of ferromagnetic oxides	31-12-1963
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52 (C.O.) 3	Terms and definitions for printed circuits	31-8-1963
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02 (C.O.) 3	Amendments to 01 (C.O.) 340 : Report on standard atmospheric conditions for test purposes	15-2-1963
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BIBLIOGRAPHIE

Commission Electrotechnique Internationale

Publication 98. Deuxième édition. — Disques moulés et appareils de lecture.

Prix : Fr. s. 12.—

Publication 153-1. Première édition. — Guides d'ondes métalliques creux.

Première partie : prescriptions générales et méthodes de mesure.

Prix : Fr. s. 9.—

Publication 158-1. Première édition. — Appareillage de commande à basse tension à usage industriel. Première partie : Contacteurs.

Prix : Fr. s. 35.—

Modification n° 2 à la Publication 68-1. Deuxième édition 1960. — Essais fondamentaux climatiques et de robustesse mécanique recommandés pour les pièces détachées pour matériel électronique. Première partie : Généralités.

Prix : Fr. s. 3,75.

Modification n° 1 à la Publication 94. Deuxième édition 1962. — Systèmes d'enregistrement et de lecture sur bandes magnétiques : Dimensions et caractéristiques.

Prix : Fr. s. 3,75.

Publication 164. Première édition. — Recommandation dans le domaine des grandeurs et unités utilisées en électricité.

Prix : Fr. s. 25.—

Publication 171. Première édition. — Paramètres fondamentaux des connecteurs pour plaquettes de câblage imprimé.

Prix : Fr. s. 3.—

Publication 92-1. Deuxième édition. — Installations électriques à bord des navires. Première partie : Règles générales.

Prix : Fr. s. 35.—

Publication 151-5. Première édition. — Mesures des caractéristiques électriques des tubes électroniques. 5^e partie : Méthodes de mesure du souffle et du ronflement.

Prix : Fr. s. 4,50.

Publication 173. Première édition. — Couleurs pour les conducteurs des câbles souples.

Prix : Fr. s. 3.—.

Ces publications sont en vente au Bureau Central de la C.E.I. (1, rue de Varembe, Genève). Les prix ci-dessus indiqués ne comprennent pas les frais de port et d'emballage.

BIBLIOGRAPHY

International Electrotechnical Commission

Publication 98. Second edition. — Processed disk records and reproducing equipment.

Price : Sw. Fr. 12.—.

Publication 153-1. First edition. — Hollow metallic waveguides. Part 1 : General requirements and measuring methods.

Price : Sw. Fr. 9.—.

Publication 158-1. First edition. — Low-voltage controlgear for industrial use. Part 1 « Contactors ».

Price : Sw. Fr. 35.—.

Amendment n° 2 to Publication 68-1. Second edition 1960. — Recommended basic climatic and mechanical robustness testing procedure for components for electronic equipment. Part 1 : General.

Price : Sw. Fr. 3,75.

Amendment n° 1 to Publication 94. Second edition 1962. — Magnetic tape recording and reproducing systems : Dimensions and characteristics.

Price : Sw. Fr. 3,75.

Publication 164. First edition. — Recommendations in the field of quantities and units used in electricity.

Price : Sw. Fr. 25.—.

Publication 171. First edition. — Fundamental parameters of connectors for printed wiring boards.

Price : Sw. Fr. 3.—.

Publication 92-1. Second edition. — Electrical installations in ships. Part 1 : General requirements.

Price : Sw. Fr. 35.—.

Publication 151-5. First edition. — Measurements of the electrical properties of electronic tubes and valves. Part 5 : Methods of measuring hiss and hum.

Price : Sw. Fr. 4,50.

Publication 173. First edition. — Colours of the cores of flexible cables and cords.

Price : Sw. Fr. 3.—.

These publications are on sale at the Central Office of the I.E.C. (1, rue de Varembe, Geneva). The prices do not include postage and packing.

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Monograph on radioelectric measurements and standards (Proceedings XIIIth General Assembly, London, 1960), **133**, 111.

Commission II :

- Propagation des ondes radioélectriques dans la troposphère (Comptes rendus XIII^e Assemblée Générale, Londres, 1960), **139**, 194.
Radio wave propagation in the troposphere (Proceedings XIIIth General Assembly, London, 1960), **139**, 196.

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Monographie sur les radio communications ionosphériques (Comptes rendus XIII^e Assemblée Générale, Londres, 1960), **137**, 20.
Monograph on Ionospheric Radio (Proceedings XIIIth General Assembly, London, 1960), **137**, 22.

Commission IV :

- Désignation d'un Secrétaire, **137**, 23.
Investigation of Tropical Lightning Discharge, **137**, 24.

Monographie sur les bruits radioélectriques d'origine terrestre (Comptes rendus XIII^e Assemblée Générale, Londres, 1960), **139**, 195.

Radio noise of terrestrial origin (Proceedings of the XIIIth General Assembly, London, 1960), **139**, 197.

Mesure des caractéristiques du bruit radioélectrique d'origine terrestre (rapport spécial de l'U.R.S.I., n° 7), **138**, 109.

The measurement of characteristics of terrestrial radio noise (U.R.S.I. special report n° 7), **138**, 113.

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Commission VI :

Rapport du Comité National des E. U. A., **141**, 5.

Report of the U. S. National Committee, **141**, 5.

Radio Waves and Circuits (Proceedings XIIIth General Assembly ; London, 1960), **141**, 37.

COMITÉ DE L'U.R.S.I. — U.R.S.I.COMMITTEES.

C.I.G. :

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Symposium on Equatorial Aeronomy. Recommendations for I.Q.S.Y., **137**, 70.

Minutes of the Fourth Meeting (Tokyo, 1963), **140**, 23.

C.C.I.R. :

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Rapport de la Délégation de l'U.R.S.I. à l'Assemblée Plénière du C.C.I.R., **139**, 12.

Report of the U.R.S.I. delegation to the Plenary Assembly of C.C.I.R., **139**, 28.

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I.U.W.D.S. :

- Minutes of the Brussels Meetings, **136**, 13.
- Relationship between I.U.W.D.S. and C.O.S.P.A.R., **136**, 26.
- Manuel des codes des Ursigrammes, supplément, **136**, 27.
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- Report of C.I.G. — I.Q.S.Y. Working Group on World Days, **138**, 27.
- Calendrier Géophysique International pour 1964 et 1965, **139**, 54.
- International Geophysical Calendar for 1964 and 1965, **139**, 64.

COMITÉS INTER-UNIONS — INTER-UNION COMMITTEES.

Ionosphère :

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- Constitution of an Inter-Union Committee on the Ionosphere, **137**, 77.

Radio-Météorologie :

- 1964 World Conference on Radio Meteorology, **141**, 24 (Boulder, Septembre 1964).

Attributions de fréquence — Frequency allocations : I.U.C.A.F.

- Report of the Geneva Meeting, **136**, 30.
- Project West Ford, **136**, 11 ; **138**, 86.
- Characteristics of radio astronomical observatories, **137**, 80.
- Lettre du Secrétaire Général de l'U.R.S.I. aux Comités Nationaux, **138**, 70.
- Letter from the U.R.S.I. Secretary General to the National Committees, **138**, 71.
- Report on the Xth Plenary Assembly of the C.C.I.R., **138**, 73.
- Reference (bibliography), **138**, 99.
- Report on the Fourth Meeting (Paris, 1963), **139**, 44.
- Bibliography, **140**, 78 ; **141**, 26.

I.C.S.U. :

- Advisory Committee on Scientific Research in Meteorology with Artificial Satellites, **136**, 46.
- I.C.S.U. Review of World Science, **137**, 81.
- Structure of I.C.S.U. Secretariat, **137**, 81.
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A.G.I.-I.G.Y.

France — Documentation, **138**, 100.
United Kingdom — Bibliography, **138**, 100.
India — Publication of Data, **139**, 155.
Symposium on Results of the I.G.Y.-I.G.C. (Los Angeles, 1963),
139, 152.

A.I.S.C.-I.Q.S.Y. :

I.Q.S.Y. Notes, **138**, 69.
U.R.S.I.-C.I.G. Committee — Minutes of the Third meeting (Rome,
1963), **137**, 32.
Procès-verbal de la 3^e réunion (Rome, 1963), **139**, 8.
Report of the C.I.G.-I.Q.S.Y. Working Group on World Days, **138**, 27 ;
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Report of the C.I.G.-I.Q.S.Y. Working Group V (Rome, 1963),
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Programme ionosphérique et recommandations pour les A.I.S.C.
Rapport du Groupe de Travail V du Comité C.I.G.-I.Q.S.Y.
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Symposium on Equatorial Aeronomy (Lima, 1962). Recommen-
dations for I.Q.S.Y., **137**, 70.
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Calendrier Géophysique International pour les A.I.S.C. 1964 et
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International Geophysical Calendar for I.Q.S.Y. 1964 and 1965,
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U.R.S.I.-C.I.G. Committee — Minutes of the Fourth Meeting
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C.O.S.P.A.R. :

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C.C.I.R. :

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Scientific conference Papers and Proceedings, **138**, 105.

FÉDÉRATION INTERNATIONALE D'ASTRONAUTIQUE — INTERNATIONAL ASTRONAUTICAL FEDERATION.

Désignation d'un Secrétaire, **137**, 110.

Décès du Prof. Théodore Von Karman, **138**, 106.

Réunion sur la Physique du Milieu Spatial, **139**, 191.

Meeting on the Physics of the Space Environment, **139**, 192.

XV^e Congrès International, **141**, 36.

XVth International Congress, **141**, 36.

COMMISSION ELECTROTECHNIQUE INTERNATIONALE (C. E. I.).

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Bibliographie, **137**, 132, 133 ; **138**, 115, 116 ; **139**, 200 ; **140**, 80, 83 ; **141**, 41, 42.

DIVERS — MISCELLANEOUS.

Nations Unies — United Nations.

Resolution adopted by the General Assembly of the O.U.N. on International Cooperation in the peaceful uses of outer space, **136**, 50.

Colloques — Symposia.

- Proceedings of the Symposium on Electromagnetic Theory and Antennas (Copenhagen, 1962), **137**, 75.
Symposium on Equatorial Aeronomy (Lima, 1962). Recommendations for I.Q.S.Y., **137**, 70.
Symposium U.A.I./U.R.S.I. sur la Galaxie et les Nuages Magellan, **138**, 103.
Symposium on the ionospheric propagation of VLF electromagnetic waves, Boulder, August 1963, **138**, 16.
Symposium on Results of the I.G.Y.-I.G.C. (Los Angeles, 1963), **139**, 152.
Symposium on signal statistics (Seattle, 1963), **140**, 37.
Conference on non linear processes (Boulder, 1963), **140**, 39.
Conference on precision electromagnetic measurement, **141**, 13.
C.O.S.P.A.R. Meetings, **136**, 45.
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Publications de l'U.R.S.I. — U.R.S.I. Publications :

- Monographie sur les mesures et étalons radioélectriques, **138**, 107.
Monograph on radioelectric measurements and standards, **138**, 111.
U.R.S.I. Special Report n° 6 on radio observations of the aurora, **138**, 112.
Rapport spécial de l'U.R.S.I. sur les observations radioélectriques des aurores, **138**, 108.
U.R.S.I. Special Report n° 7 on the measurement of characteristics of terrestrial radio noise, **138**, 113.
Rapport Spécial n° 7 de l'U.R.S.I. sur la mesure des caractéristiques du bruit radioélectrique d'origine terrestre, **138**, 109.
Propagation des ondes radioélectriques dans la troposphère. (Comptes rendus Commission II, Londres, 1960), **139**, 194.
Radio wave propagation in the troposphere (Proceedings of Commission II, London, 1960), **139**, 196.
Monographie sur les bruits radioélectriques d'origine terrestre (Comptes rendus commission IV, Londres, 1960), **139**, 195.
Radio noise of terrestrial origin (Proceedings of Commission IV, London, 1960), **139**, 197.
Monograph on Radio waves and circuits, **139**, 198.
Radio waves and circuits (Proceedings of Commission VI, London, 1960), **141**, 37.
Catalogue des publications de l'U.R.S.I., **141**, 37.
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