

U. R. S. I.

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IN MEMORIAM

William D. George

Mr. William D. George, Vice-Chairman of U.R.S.I. Commission I since 1954, and assistant chief for radio frequencies of the Radio Standards Division of the National Bureau of Standards, Boulder Laboratories, was killed in an automobile accident on February 12th, 1963, in Switzerland while he was attending the C.C.I.R. Plenary Assembly.

U.R.S.I. and particularly Commission I will be deeply affected by this loss. Members of Commission I and all those interested in radio measurements and standards who attended the London General Assembly in 1960, will remember the active role he played during the meeting in sharing with the Chairman the heavy burden of the organization of the scientific sessions.

He has shown the same activity in the preparation of the forthcoming General Assembly and his absence will be felt with deep sorrow in Tokyo.

ARTICLE D'INFORMATION

Assemblée Provisoire de 1921

Au moment où nous nous apprêtons à célébrer le cinquantième anniversaire de l'U.R.S.I., il nous a paru intéressant de publier le procès-verbal de l'Assemblée Provisoire tenue en 1921.

L'Assemblée provisoire de l'Union de Radiotélégraphie Scientifique Internationale, convoquée sur l'initiative de Mr. le Général Ferrié le 22 juillet 1921, et composée de :

MM. le Général FERRIÉ,
Général SQUIRE,
Professeur AUSTIN,
Professeur ABRAHAM,
Professeur VALLAURI,
Ingénieur SHAUGHNESSY,
Dr. DELLINGER,
Dr. KENNELLY,
Dr. GOLDSCHMIDT,

a décidé :

que la date de la réunion officielle sera fixée à l'année prochaine à une époque précédant celle de la réunion éventuelle de la grande Conférence Internationale Plénière des communications par T.S.F.

que quelques questions seront étudiées dès à présent dans les différents pays, à savoir :

- 1° la propagation des ondes { direction
intensité
- 2° les parasites { direction
intensité
simultanéité, etc.

qu'à cet effet des émissions dites « scientifiques » seront faites par les différentes stations suivant un programme à décider par une Sous-Commission composée de :

MM. le Général FERRIÉ,
D^r AUSTIN,
Professeur VALLAURI,
Ingénieur SHAUGHNESSY,
Dr. GOLDSCHMIDT ;

que des formulaires provisoires établis suivant un texte proposé par la Sous-Commission seront envoyés de Bruxelles aux différentes stations de T.S.F. adhérentes ;

que ces formulaires seront ensuite retournés et centralisés à Bruxelles ;

qu'ils serviront à rédiger les formulaires définitifs et à régler les émissions intercontinentales scientifiques ;

M. Abraham propose une entente avec les observatoires astronomiques pour que l'horloge fondamentale des observatoires soit réunie directement par fil spécial aux stations de T.S.F. et que des indications puissent être transmises.

M. Ferrié propose de refaire le fuseau des longitudes et de redéterminer la vitesse des ondes en collaboration avec les astronomes.

Première Assemblée Générale

COMTE-RENDU

See English Text, p. 9

La Première Assemblée Générale de l'U.R.S.I. s'est tenue à Bruxelles du 24 au 28 juillet 1922 sous la présidence du Général Ferrié, Président de l'Union. Le compte-rendu de cette réunion n'a jamais été publié, aussi nous a-t-il paru utile, pour compléter la série des volumes donnant les comptes-rendus des Assemblées Générales de donner un bref compte-rendu de cette Assemblée.

Ont assisté aux séances :

une délégation *britannique* composée de :

Sir R. GLAZEBROOK, *Président*,

MM. l'Amiral JACKSON, MURRAY, SHAUGHNESSY, DYE.

une délégation *belge*, composée de :

MM. DE DONDER, *Président*,

PHILIPPSON, Père LUCAS ;

une délégation *américaine* composée de :

MM. L. W. AUSTIN, *Président*,

ALEXANDERSON ET KENNELLY ;

une délégation *française* composée de :

MM. le Général FERRIÉ, *Président*,

BAILLAUD-ABRAHAM et LATOUR ;

une délégation *italienne* :

M. VANNI, *Président* ;

une délégation *norvégienne* composée de :

MM. ENGSET, *Président*,

GYTHFELDT.

et M. R. GOLDSCHMIDT, Secrétaire Général de l'Union.

Les Membres du Comité National Belge étaient présents.

L'Assemblée a constaté que 4 pays adhèrent dès à présent à l'Union Internationale de Radiotélégraphie Scientifique, à savoir : l'Angleterre, la Belgique, les Etats-Unis et la France. Toutefois l'adhésion de l'Australie peut être considérée comme acquise ; celle de l'Italie est certaine ; M. Engset, délégué norvégien, a entamé des démarches auprès des autorités compétentes de son pays, l'Espagne a annoncé la constitution d'un Comité National ; enfin,

après la clôture des travaux, le Bureau a reçu une lettre de M. Sakurai annonçant l'adhésion probable du Japon.

Les statuts de l'Union ont été réexaminés par l'Assemblée, qui en a arrêté le texte définitif ainsi que sa traduction anglaise.

En ce qui concerne la composition du Comité Exécutif, l'Assemblée rendant hommage au travail accompli par le Bureau actuel, l'a réélu à l'unanimité. Ultérieurement, et sur la proposition de M. Engset, elle a nommé comme Vice-Président M. Bjerkes, sous la double condition de l'adhésion de la Norvège et de l'acceptation du savant norvégien.

L'Assemblée a fixé à quatre le nombre des Commissions, à savoir :

- 1^o la Commission des Méthodes de Mesures et Etalonnages, Président M. ABRAHAM ;
- 2^o la Commission de la Propagation, Président M. AUSTIN ;
- 3^o la Commission des Perturbations atmosphériques, Président M. ECCLES.
- 4^o la Commission de Liaison avec les Opérateurs, Praticiens et Amateurs, Président M. VANNI.

Conformément aux Statuts, les Membres de ces Commissions ont été désignés (Annexe I) sur la proposition du Comité Exécutif, par l'Assemblée Générale qui a aussi arrêté le texte d'un règlement à adopter par ces Commissions, destiné à fixer notamment leurs relations avec le Secrétariat Général ainsi qu'avec les Comités Nationaux.

Les délégations présentes ayant donné connaissance des travaux entrepris ou projetés dans leurs pays respectifs (voir Annexe II) ont pu, tant en Assemblée plénière qu'au cours des Séances préliminaires de deux des Commissions désignées, établir un programme des recherches ultérieures et adopter des résolutions de nature à poursuivre celles-ci sur la base d'une collaboration internationale.

ANNEXE I

Liste des Membres des Commissions

COMMISSION I. — *Méthodes de Mesures et Etalonnages.*

Président : ABRAHAM.

Angleterre : DYE, GLAZEBROOK, F. E. SMITH ou MURRAY.

Belgique : HENRIOT, TRICOT, CORTEIL.
Etats-Unis : DELLINGER, GOLDSMITH.
France : ABRAHAM, JOUAUST, BETHENOD.
Italie : VANNI, VALLAURI.
Norvège : VEGARD, PETERSEN.

COMMISSION II. — *Propagation.*

Président : AUSTIN.
Angleterre : HOWE, F. E. SMITH ou MURRAY.
Belgique : DEDONDER, PHILIPPSON.
Etats-Unis : AUSTIN, ALEXANDERSON, TAYLOR.
France : MESNY, PEROT.
Italie : ARTOM, PESSION.
Norvège : PETERSEN, ENGSET, GYTHFELDT.

COMMISSION III. — *Perturbations Atmosphériques.*

Président : ECCLES.
Angleterre : ECCLES.
Belgique : WIBIER, JAUMOTTE.
Etats-Unis : AUSTIN, Cl. SQUIER.
France : Gl. FERRIÉ, ROTHE.
Italie : PESSION, SACCO, D^r de l'Observatoire de Monte Cassino.
Norvège : BJERKENS, SKOLEM, DEVIK.

COMMISSION IV. — *Liaison avec les Opérateurs, Praticiens et Amateurs.*

Président : VANNI.
Angleterre : CAMPBELL, SWINTON.
Belgique : GOLDSCHMIDT, Père LUCAS.
Etats-Unis : KENNELLY.
France : JULLIEN, BRENOT.
Italie : VANNI, BARDELONI.
Norvège : pas encore désignés.

**Liste des Communications
présentées à la 1^{re} Assemblée Générale de l'U.R.S.I.**

- Note destinée à contribuer à la discussion sur la mesure absolue des champs électromagnétiques, W. H. ECCLES.
 - Communication du Prof. VANNI sur les travaux réalisés par les techniciens des établissements de l'Armée et de la Marine Italiennes.
 - Radiation measurements of arc and valve at Stonehaven Wireless Telegraphy Station.
 - Note sur les parasites atmosphériques et l'emploi de la radiogoniométrie, E. ROTHE.
 - Rapport sur les observations des signaux U.R.S.I. effectuées à Meudon, R. MESNY.
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First General Assembly

PROCEEDINGS

The first General Assembly of U.R.S.I. was held in Brussels, from July 24th to 28, 1922, under the chairmanship of General Ferrié, President of the Union. The proceedings of this Assembly has never been published ; in order to complete the series of Volumes on General Assemblies it has been thought useful to give a short review of that first Assembly.

Were present :

from Belgium :

MM. DE DONDER, *Chairman*,
PHILIPPSON, Père LUCAS.

from England :

Sir R. GLAZEBROOK, *Chairman*,
MM. Amiral JACKSON, MURRAY, SHAUGHNESSY, DYE.

from France :

MM. General FERRIÉ, *Chairman*,
BAILLAUD, ABRAHAM and LATOUR.

from Italy :

M. VANNI, *Chairman*,

from Norway :

MM. ENGSET, *Chairman*,
GYTHFELDT.

from U. S. A. :

MM. L. W. AUSTIN, *Chairman*,
ALEXANDERSON AND KENNELLY.

and Dr. R. B. GOLDSCHMIDT, *Secretary General of U.R.S.I.*

Members of the Belgian National Committee attended the sessions.

The Assembly noted that four countries were adhering to the International Scientific Radiotelegraphy Union, namely Belgium, England, France and U. S. A. Moreover the adherence of Australia may be considered as a certainty; the adherence of Italy was certain; Mr. Engset, Norwegian delegate, had taken contacts with the interested agencies of his country, Spain had announced the constitution of a National Committee and, after the closing of the meeting, the Board received a letter from Mr. Sakurai to announce the probable adherence of Japan.

The statutes of the Union were revised by the Assembly and the final text together with the English version were adopted.

As regards the membership of the Executive Committee, the Assembly wishing to show their thankfulness for the work carried out unanimously re-elected the previous Committee. Later on, and on the proposal of Mr. Engset, the Assembly elected Mr. Bjerknæs as Vice-President provided the adherence of Norway and the agreement of the Norwegian scientist.

The Assembly decided to appoint four Commissions, namely :

- I. on Measurement Methods and Standardization, *Chairman* Prof. ABRAHAM.
- II. on Propagation, *Chairman*, Dr. AUSTIN.
- III. on Atmospheric, *Chairman* Dr. ECCLES.
- IV. on Liaisons with Operators, Practitioners and Amateurs, *Chairman*, Prof. VANNI.

In accordance with the statutes the members of the Commissions were appointed by the General Assembly on the proposal of the Executive Committee (Appendix I); the Assembly also adopted rules of the Commissions to define inter alia their relations with the General Secretariat and with the National Committees.

The delegations attending the meeting gave a review of the works carried out or to be carried out in their respective countries (Appendix II) and during plenary Assembly or during preliminary sessions held by two Commissions, drafted a research programme for the future and adopted resolutions in order to pursue the research on a basis of international collaboration.

APPENDIX I

Membership of the Commissions

COMMISSION I. — *On Measurement Methods and Standardization.*

Chairman : ABRAHAM.

Belgium : HENRIOT, TRICOT, CORTEIL.

England : DYE, GLAZEBROOK, F. E. SMITH OF MURRAY.

France : ABRAHAM, JOUAUST, BETHENOD.

Italy : VANNI, VALLAURI.

Norway : VEGARD, PETERSEN.

U. S. A. : DELLINGER, GOLDSMITH.

COMMISSION II. — *On Propagation.*

Chairman : AUSTIN.

Belgium : DEDONDER, PHILIPPSON.

England : HOWE, F. E. SMITH OF MURRAY.

France : MESNY, PEROT.

Italy : ARTOM, PESSION.

Norway : PETERSEN, ENGSET, GYTHFELDT.

U. S. A. : AUSTIN, ALEXANDERSON, TAYLOR.

COMMISSION III. — *On Atmospherics.*

Chairman : ECCLES.

Belgium : WIBIER, JAUMOTTE.

England : ECCLES.

France : GL. FERRIÉ, ROTHE.

Italy : PESSION, SACCO, D^r de l'Observatoire de Monte Cassino.

Norway : BJERKENS, SKOLEM, DEVIK.

U. S. A. : AUSTIN, CL. SQUIER.

COMMISSION IV. — *On Liaison with Operators, Practitioners and Amateurs.*

Chairman : VANNI.

Belgium : GOLDSCHMIDT, PÈRE LUCAS.

England : CAMPBELL, SWINTON.

France : JULLIEN, BRENOT.

Italy : VANNI, BARDELONI.

Norway : Not yet designed.

U. S. A. : KENNELLY.

APPENDIX II

List of Papers

submitted at the first General Assembly of U.R.S.I.

- Note for contribution to discussion on absolute measurement of electromagnetic fields, W. H. ECCLES.
- Communication du Prof. VANNI sur les travaux réalisés par les techniciens des établissements de l'Armée et de la Marine Italiennes.

- Radiation measurements of arc and valve at Stonehaven Wireless Telegraphy Station.
 - Note sur les parasites atmosphériques et l'emploi de la radiogoniométrie, E. ROTHE.
 - Rapport sur les observations des signaux U.R.S.I. effectuées à Meudon, R. MESNY.
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COMITÉS NATIONAUX

Belgique

REUNIONS

Le Comité National belge a pris l'habitude de se réunir au Palais des Académies, à Bruxelles, pour entendre et discuter des exposés scientifiques présentés par ses membres effectifs ou ses membres associés :

Le 12 avril 1961 :

- un exposé de M. COUTREZ sur les aspects généraux de la XIII^e Assemblée Générale de l'U.R.S.I.
- un exposé de M. GONZE sur les travaux de la Commission V (Radioastronomie) à la XIII^e Assemblée Générale de l'U.R.S.I.
- un exposé de M. BEAUFAYS sur les travaux de la Commission VI (Théorie des circuits).

Le 24 mai 1961, exposé de M. NICOLET sur les résultats des communications relatives à l'ionosphère faites lors de récents congrès, et sur l'état et les tendances actuels de l'ensemble de la question.

Le 17 janvier 1962, après un exposé introductif de M. NICOLET, MM. MAENHOUDT et BOSSY exposent leurs vues sur quelques types de propagation anormale observés en 1961, sur des fréquences voisines de 100 MHz.

Le 16 mai 1962, MM. CHARLES et GENNART font un exposé sur leurs travaux relatifs au problème intérieur des antennes circulaires.

Le 12 décembre 1962, MM. HONTOY et LAURENCIN font un exposé sur leurs travaux relatifs aux problèmes de l'emploi en radio-électricité des résonances dans la matière.

Le 6 février 1963, M. VAN ECK fait un exposé de ses travaux sur la mesure des champs magnétiques par la spectroscopie hertzienne.

En dehors de ces exposés faits devant le Comité belge de l'U.R.S.I., des membres effectifs et des membres associés ont publié récemment une importante série d'articles.

- P. BAUDOUX. — *Electricité* : Tome I, Lois fondamentales, Milieux, Systèmes, Circuits, 242 p. - Tome II, Electromagnétisme, Electrostatique, Propagation, 464 p. - Paris, Dunod et Bruxelles, Presses académiques européennes, 1959-1960.
- P. BAUDOUX. — Etudes théoriques et expérimentales sur les noyaux ferromagnétiques (en collaboration avec O. BEAUFAYS, R. BODART, P. CEUPPENS, Ch. LAFLEUR et R. VANHEUSDEN). *Bulletin n° 4 de l'Institut de Physique*. Service d'Electricité, Université de Bruxelles (Presses académiques européennes), 1960.
- P. BAUDOUX. — Contributions à l'Etude des Plasmas. Sur les conditions limites de la magnétohydrodynamique. *Ibid.*, *Bulletin n° 6*, pp. 1-19.
- J. CHARLES et P. E. GENNART. — « La mise en œuvre d'une méthode variationnelle ». Centre belge de recherches mathématiques. Colloque sur l'Analyse numérique de Mons, mars 1961. Gauthier-Villars, Paris.
- J. CHARLES et P. E. GENNART. — « Deux méthodes de calcul de l'impédance d'entrée d'une antenne quasi-linéaire de forme circulaire ». *Revue HF*, V, 5, 1962.
- V. BELEVITCH. — « Some optimum properties of n-ports », *Trans. I.R.E.*, vol. CT-9, n° 3, Sept. 1962, pp. 295-296.
- V. BELEVITCH. — « The number of states of rectifier networks », *Trans. I.R.E.*, vol. CT-9, n° 1, March 1962, pp. 93-94.
- V. BELEVITCH, P. GUERET, J.-C. LIENARD. — « Le skin-effect dans un ruban », *Rev. HF*, vol. 5, n° 5, avril 1961, pp. 109-115.
- V. BELEVITCH. — « Summary of the history of circuit theory », *Proc. I.R.E.*, vol. 56, n° 5, May 1962, pp. 848-855.
- V. BELEVITCH. — « On network analysis by polynomials matrices », Symposium on Network Theory, Cranfield (England), September 1961. To be published by Pergamon Press.
- V. BELEVITCH. — « On the realizability of graphs with prescribed circuit matrices », Symposium on the Applications of Switching Theory, Sunnyvale (California), Febr. 1962. To be published by Stanford University Press.
- R. COUTREZ. — « Problèmes théoriques et Méthodes d'observation en Radioastronomie ». Un volume de 138 pp., cours donné à la Faculté des Sciences de l'U. L. B., en 1960.

- R. COUTREZ. — « La Radioastronomie en Belgique ». Collection « Le Mouvement scientifique en Belgique » Fédération des Sociétés scientifiques, Fasc. 6, pp. 397-408, 1961.
- R. COUTREZ. — Correlation between S. E. A.'s and solar events. Proc. N.A.T.O. Institute for Advanced Studies Corfu 1962, in « Radio-astronomical and Satellite Studies of the Atmosphere » North Holland Publishing Co. Ed. J. Aarons, pp. 476-501, 1963, en collaboration avec R. GONZE, A. KOECKELENBERGH, E. POURBAIX et R. ROQUIGNY.
- R. COUTREZ. — Radioémission d'origine solaire. Un volume de 100 pp., Supp. 1960, *Il Nuovo Cimento*, Bologna, Rendiconti S. I. F. Varenna, IB. Monographies de l'Observatoire Royal de Belgique 8, 1961.

Publications de M. NICOLET (1959-1962) :

- La Thermosphère, *Annales de Géophysique*, tome 15, n° 1, janvier-mars 1959.
- The Constitution and composition of the upper atmosphere. *Proc. I.R.E.*, vol. 47, n° 2, February 1959.
- Collision frequency of electrons in the terrestrial atmosphere, *The Physics of fluids*, vol. 2, n° 2, March-April 1959.
- Constitution of the atmosphere at ionospheric levels, *Journal of Geophysical research*, vol. 64, n° 12, December 1959.
- Ion-atom interchange (en collaboration avec D. R. BATES), *Journal of atmospheric and terrestrial physics*, vol 18, 1960.
- The formation of the D region of the ionosphere, *Journ. of geophysical research*, vol. 65, n° 5, May 1960.
- Aeronomic chemical reactions, Chap. 2 in *Physics and Medecine of the Atmosphere and Space*, J. Wiley and Sons, New York, 1960.
- Les variations de la densité et du transport de chaleur par conduction dans l'atmosphère supérieure, Contribution n° 62, Inst. Royal Météorol. de Belgique, 1960.
- Structure of the thermosphere, *Planet. Space Sci.*, vol. 5, pp. 1-32, Pergamon Press, 1961.
- Effets de l'ultraviolet lointain solaire sur l'atmosphère de la terre et des autres planètes, Rapport introductif, *Mém. Soc. R. Sc. Liège*, cinquième série, tome IV, 1961.
- Rate of ion-atom interchange (en collaboration avec D. R. BATES), *Journ. of atmosph. and terrestrial physics*, 1961, vol. 21, pp. 286-287.
- Les modèles atmosphériques et l'Hélium, Space research II : Proc. second internat. space science symposium (Florence, April 1961).
- Helium, an important constituent in the lower exosphere, *Journ. Geophysical research*, vol. 66, n° 7, July 1961.
- Aux confins de l'atmosphère terrestre, *Journal des ingénieurs*, 10 (1), 13, 18, 1961.

- Density and energy in the upper atmosphere, *Journ. of the physical society of Japan*, vol. 17, suppl. A-1, 1962.
- Photochimie aéronomique, *Bull. Soc. Chim. Belg.*, vol. 71, pp. 665-669, 1962.
- Le problème aéronomique de l'hélium et de l'hydrogène neutres (en collaboration avec G. KOCKARTS), *Ann. de Géophysique*, tome 18, n° 3, juillet-sept. 1962.

* * *

- R. GONZE. — Observations radioélectriques solaires sur 169 MHz et 600 MHz en 1959. Communication de l'Observatoire Royal de Belgique, n° 192, pp. 38, en collaboration avec P. EVRARD.
- R. GONZE. — Observations radioélectriques solaires sur 600 MHz en 1960. Communication de l'Observatoire Royal de Belgique, n° 194, p. 26, en collaboration avec A. FRASELLE.
- E. DIVOIRE et A. DUMONT. — Les paramètres du transistor en haute fréquence, Calcul d'un amplificateur à 455 k s/s. *Revue H. F.*, vol. III, n° 10, 1957.
- P. HONTOY. — Contribution à l'étude des filtres électro-mécaniques. Thèse d'agrégation de l'enseignement supérieur 1958.
- J. L. VAN ECK. — Etude d'un appareil destiné à mesurer le spectre énergétique d'un rayonnement nucléaire. *Revue générale des Sciences appliquées* (Bruxelles), tome IV, n° 5, 1959.
- P. GOVAERTS. — Conditions de fonctionnement d'un oscillateur bloqué. *Revue H. F.* (Bruxelles), vol. IV, n° 6, 1959.
- P. CANEI et A. SMEYSTERS. — Eléments spéciaux de lignes de transmission en hyperfréquences utilisant des ferrites. Exploitation des phénomènes liés à la résonance magnétique électronique. *Revue générale des Sciences appliquées* (Bruxelles), tome V, n° 5, 1960.
- Ph. HUTEREAU et M. WIRTZ. — Sur l'application des méthodes topologiques au circuit à déclenchement de Schmitt. *Bulletin de la Classe des Sciences de l'Académie royale de Belgique*, 5^e série, tome XLVI, n° 11, 1960.
- P. CANEI et A. SMEYSTERS. — Eléments spéciaux de lignes de transmission en hyperfréquences utilisant des ferrites. *Revue H. F.* (Bruxelles), vol. V, n° 2, 1961.
- P. HONTOY et J. L. VAN ECK. — Effets de résonance dans la matière. *Revue H. F.* (Bruxelles), vol. V, n° 6, 1962.
- R. LAURENCIN. — Expériences sur l'absorption dans une cellule à ammoniac au voisinage de 23,87 GHz. *Revue H. F.* (Bruxelles), vol. V, n° 6, 1962.
- J. L. VAN ECK. — La mesure des champs magnétiques par résonance magnétique nucléaire. *Revue H. F.* (Bruxelles), vol. V, n° 6, 1962.
- R. PASTIELS. — Les équipements d'observation visuelle ou photoélectrique du passage des satellites artificiels, C. N. R. E., notes préliminaires, n° 17, 1961.

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Greece

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COMMISSIONS ET COMITÉS

Commission III. — Radioélectricité Ionosphérique

DOCUMENTATION

L'article ci-après, rédigé par R. P. Froom a paru dans le *Journal des Télécommunications*, vol. 30, n° 3 (mars 1963).

Monograph on ionospheric radio. — XIIIth General Assembly of U.R.S.I., London, September 1960 (Monographie sur les radiocommunications ionosphériques, XIII^e Assemblée générale de l'U.R.S.I., Londres, septembre 1960), par W. J. G. Beynon (1).

Ce volume, qui fait partie d'une série consacrée aux travaux de la XIII^e Assemblée Générale de l'Union radio-scientifique internationale (U.R.S.I.) (Londres 1960), contient des articles sur huit sujets d'une importance fondamentale pour les radiocommunications ionosphériques :

- répartition verticale des électrons dans l'ionosphère (profils $N(h)$),
- ionisation dans la région F2,
- ionisation sporadique de la couche E,
- données sur l'ionosphère fournies par les fusées et les satellites,
- ondes hydromagnétiques et émissions sur ondes myriamétriques,
- études radioélectriques des aurores,
- diffusion ionosphérique des ondes radioélectriques,
- dérives de l'ionosphère.

(1) Un volume relié, XI, 264 p. illust., tabl., diagrs 23 × 15 cm. Publié par Elsevier Publishing Company, 110-112 Spuistraat, Amsterdam, 1962. Prix : 32.50 florins hollandais.

Chacun de ces sujets a donné lieu à divers mémoires qui ont été lus devant l'assemblée générale par des savants et des ingénieurs de réputation internationale. Il serait désobligeant de citer un nom plutôt qu'un autre mais on peut être assuré que la valeur de chacun de ces auteurs garantit l'exactitude et l'actualité des thèmes étudiés dans les différents mémoires.

Comme on peut s'en rendre compte d'après la liste ci-dessus, la plupart des problèmes traités, bien que développant au fond, des considérations passablement théoriques, présentent un intérêt direct indiscutable pour les ingénieurs des radiocommunications qu'intéresse la propagation des ondes dans l'ionosphère. La compilation d'un volume de ce genre, qui rassemble sous la même couverture toute une série d'articles qui se complètent, a une grande valeur pour l'étudiant ou l'ingénieur en ce sens qu'elle lui fait réaliser une économie de lecture et lui épargne les longues recherches habituelles dans les bibliographies techniques lorsqu'il est en quête de documentation.

Chaque ensemble d'articles traitant un sujet particulier est suivi d'un compte rendu de la discussion qui a eu lieu pendant l'assemblée générale, ce qui prolonge de façon intéressante les mémoires eux-mêmes et permet au lecteur de connaître les réactions qu'ils ont suscitées.

Le livre est imprimé avec soin et bien relié, conformément à ce que l'on attend des publications techniques de cet éditeur. Les articles comportent des graphiques et des diagrammes clairement dessinés ; chaque chapitre est accompagné d'une bibliographie complète qui constitue une source précieuse de lectures complémentaires.

En somme, il s'agit là d'une contribution de valeur à l'étude des radiocommunications ionosphériques et l'on ne peut que vivement la recommander à quiconque désire se familiariser avec les développements survenus tout récemment dans le domaine fascinant de la technique des radiocommunications.

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The following review by R. P. Froom has been published in the *Telecommunication Journal*, vol. 30, n° 3 (March 1963).

Monograph on ionospheric radio. — XIIIth General Assembly of U.R.S.I., London, September 1960, by W. J. G. Beynon ⁽¹⁾.

This volume, which forms one of a series devoted to the proceedings of the XIIIth General Assembly of the International Radio Scientific Union (U.R.S.I.), London, 1960, contains papers on eight subjects of fundamental importance to ionospheric radio. These subjects are :

- the vertical distributions of electrons in the ionosphere ($N(h)$ profiles),
- F-2 region ionization,
- sporadic-E ionization,
- rocket and satellite data for the ionosphere,
- hydromagnetic waves and VLF emissions,
- radio studies of the aurora,
- ionospheric scattering of radio waves, and
- ionospheric drifts.

Each of these sections consists of a series of papers read before the General Assembly, by scientists and engineers of international reputation in their particular fields of study. It would be invidious to single out individual names for specific mention, but it may be taken for granted that the eminence of the individual contributors is a guarantee of the accuracy and modernity of the themes elaborated in the various articles.

As may be seen from the list given above, most of the problems treated, although fairly theoretical in substance, are nevertheless of direct and compelling interest to the radio engineer who is interested in the problems of ionospheric radio propagation. The compilation of a volume such as this, in which are gathered together under one cover a whole series of interrelated articles is of great value to the student or to the practising engineer, as it represents a great economy of reading and of space as compared with the usual

⁽¹⁾ One bound volume, pp. xi + 264, illustrations, tables, diagrams, 23 × 15 cm. Published by Elsevier Publishing Company, 110-112 Spuistraat, Amsterdam, 1962, Price 32.50 Dutch florins.

long searches through a technical bibliography or abstracts in search of a particular piece of material.

Each set of papers dealing with a specific topic is accompanied by a reprint of the discussion which took place during the General Assembly, and this is a valuable addition to the formal text, as it gives the reader an insight into the reactions which each paper provoked among the various experts taking part in the discussion.

The book is attractively printed and well bound, as in fact one has been led to expect of the technical productions of this publisher. The papers are well illustrated with clear graphs and diagrams, and each chapter is provided with a comprehensive bibliography, which should form a valuable source of further reading matter.

All in all, this is a most valuable contribution to the literature of ionospheric radio, and is to be highly recommended to anyone wishing to make himself familiar with the latest developments in this fascinating branch of radio communications technique.

Commission IV

Bruit Radioélectrique d'Origine Terrestre

DESIGNATION D'UN SECRETAIRE

M. G. Foldès a donné sa démission en tant que Secrétaire de la Commission IV, ses occupations professionnelles le plaçant dans l'impossibilité de continuer à remplir cette fonction. Les membres de l'U.R.S.I., et plus particulièrement ceux de la Commission IV, lui expriment ici tous leurs remerciements pour la féconde activité qu'il a déployée au service de l'Union.

M. Jean Delloue (Laboratoire de Physique, 24, rue Lhomond, Paris 5^e) a accepté de remplir provisoirement les fonctions de Secrétaire de la Commission IV jusqu'à la prochaine Assemblée Générale, qui pourra donner confirmation officielle à cette nomination.

INVESTIGATION OF TROPICAL LIGHTNING DISCHARGE

We have received from Prof. D. J. Harris, Department of Electrical Engineering, Ahmadu Bello University, Zaria, Northern Nigeria, the following programme of investigation to be carried out by the Ahmadu Bello University.

1) *Collection of Statistical Data.*

This will be mainly a collection of data to determine the isoeconomic level in the region around the university. Most of this data will come from lightning stroke counters. This type of work is rather dull but very important in view of the scarcity of such information in West Africa and the present planning of high voltage distribution systems. Measurements will be extended later.

2) *Measurement of Lightning Stroke Characteristics.*

The nature of the lightning stroke in this part of the world is also largely unknown and there is need for measurement of such information as stroke intensity, polarity, rise time and wave form. These measurements could probably be carried out by making use of a local high tower (e. g. Kaduna Radio Mast) fitted with a lightning conductor. The frequent occurrence of lightning would enable direct measurements to be made rather than having to rely on magnetic links and similar devices.

3) *Measurement of Frequency Spectrum of Induction and Radiation Fields.*

It would be very useful to measure the intensity of the electric and magnetic fields over a wide range of frequencies. Such information would be important in assessing the effect of the lightning discharge on VHF and microwave communication systems. If a sufficiently high signal level is obtained at the very high frequency end of the spectrum there are many additional possibilities for general diagnostic techniques.

4) *Measurements of Ratio of Cloud-Cloud and Cloud-Earth Strokes.*

The measurement of this ratio is important in assessing the seriousness of thunder storm activity on high voltage distribution systems. Whilst there is a great deal of lightning activity in this region, a considerable proportion of it would appear to involve cloud-cloud strokes which are not so disastrous for distribution systems. Some means of measuring this ratio is required. Possible methods include the measurement of relative voltages induced in horizontal and vertical coils when the induction field is mostly measured, and the measurement of the relative strength of the vertically and horizontally polarized components of the radiation field at high frequencies.

5) *Investigation of Pre-Stroke Radiation from Thunderclouds.*

It may be possible by the use of a high-gain, high-frequency antenna to measure the radiation emitted by a thunder cloud before the main lightning discharge takes place. This might enable the build-up of charge in different parts of a cloud to be studied prior to the main stroke.

6) *Measurements of Atmospheric Electric Field Strength.*

Considerable work has been done in the past on the change of electric field strengths in non-tropical regions at a time of storm activity. The gradual build-up of charge on overhead clouds can then be investigated.

7) *High Altitude Measurements.*

It would be possible to obtain a good deal of additional information if measurements could be made at high altitude as well as at ground level. Such measurements could be carried out using captive balloon techniques and transistorized measurement equipment and transmitting equipment carried by the balloon. Such a programme would call for a form of « low level space probe technique ».

8) *Photographic and Photoelectric Measurements.*

The visible effects, that are only too apparent, should give a considerable amount of information and would be synchronised with the measurements made by electrical means.

9) *Effect of Thunderstorm Activity on High Voltage Transmission Systems.*

This is essentially a practical investigation on the behaviour of an actual transmission system during the period of thunder storm activity. Information on the type of surge induced on the transmission line for different conditions of thunder storm is urgently required in order to assess the performances of the systems at present being planned and constructed in Nigeria. A 132 kV transmission line is at present being constructed passing through Zaria and this line will not be energized for some time. It therefore offers a unique opportunity for making a study of this kind.

Many of the measurements to be made involve techniques well established in more temperate regions, although new methods will have to be evolved for investigating some of the characteristics unique to tropical thunder storms.

Commission V. — On Radio Astronomy

**CHARACTERISTICS
OF RADIOASTRONOMICAL OBSERVATORIES**

(See p. 80)

BIBLIOGRAPHY

Attention of the members of the Commission is called to the following paper published in the Proceedings of the I.E.E.E., vol. 51, n° 1 (Jan. 1963), p. 30.

« The Potentialities and Present Status of the Masers and Parametric Amplifiers in Radio Astronomy » by J. V. Jelley.

Summary. — The paper reviews the potentialities and present status of maser and parametric radiometer systems in the whole field of radio astronomy, including radar astronomy. A short historical account of the development of the maser is followed by

an outline of the objectives of radio astronomical research, and the radiation mechanisms which arise. After an account of the requirements of the radio astronomer, a detailed discussion is presented of the limitations and relative merits of masers and parametric amplifiers in this field of research.

The paper includes a compilation of data on existing and planned observatory installations. This data has been gathered from published work and from replies to a questionnaire which was widely circulated by the author ; it embraces, it is hoped, most of the currently available information. Finally, there is a brief summary of some of the achievements in astronomy which have resulted directly from the developments and applications of these low-noise devices. A few notes are added, in conclusion, as pointers to the likely trends in the near future.

Comité pour les Recherches Radioélectriques dans l'Espace

DOCUMENTATION

(See *English text*, p. 29)

Nous attirons l'attention de nos lecteurs sur l'article ci-après publié dans le *Journal des Télécommunications*, vol. 30, n° 3 (mars 1963) p. 77.

« Conférence internationale sur les télécommunications par satellites (Londres, novembre 1962) » par Y. Y. Mao, Ingénieur en C.C.I.R.

* * *

Colloque sur les radio-communications spatiales, Paris, septembre 1961.

Nous extrayons de la même revue, p. 80, un article, par Y. Y. Mao, examinant la Monographie de l'U.R.S.I. intitulée « Space Radio Communication ».

Space radio communication (Les radio-communications spatiales),
par G. M. BROWN ⁽¹⁾.

Ce volume renferme un ensemble de 37 articles publiés in extenso et accompagnés, pour certains, de résumés des discussions qui ont eu lieu lors du colloque réuni à Paris en septembre 1961 sous les auspices de l'Union radio-scientifique internationale (U.R.S.I.). Cette réunion avait un caractère international ; des savants et des ingénieurs venus de nombreux pays et des organisations internationales y participaient. Le Dr E. Metzler, directeur du Comité consultatif international des radiocommunications (C.C.I.R.), et M. John H. Gayer, Membre du Comité international d'enregistrement des fréquences (I.F.R.B.) y représentaient l'U.I.T.

Le contenu de ce volume se divise en huit chapitres présentés comme suit :

1. Introduction.
2. Lancement, commande du comportement et poursuite des satellites.
3. Assignation de fréquences, questions relatives aux brouillages nuisibles et à la propagation.
4. Matériel d'équipement des satellites.
5. Matériel d'équipement au sol.
6. Systèmes de modulation.
7. Systèmes particuliers de communication.
8. Aspects divers.

On peut voir, d'après cette liste, que les nombreux problèmes que pose le vaste domaine des radiocommunications au moyen des satellites sont traités de façon détaillée et complète. Deux articles du capitaine C. F. Booth et du Dr R. L. Smith-Rose, intitulés « La planification internationale des systèmes de communication par satellite » et « L'attribution de fréquences pour les expériences de communications spatiales » présentent un intérêt particulier pour l'U.I.T. Ils traitent des problèmes de coordination et de

⁽¹⁾ Un volume relié, XII, 630 p. tabl., diagrs. 23 × 15 cm. Publié par Elsevier Publishing Company, 110-112 Spuistraat, Amsterdam, 1962. Prix : 70 florins hollandais.

brouillages nuisibles, qui seront certainement examinés lors de la prochaine Conférence administrative extraordinaire des radio-communications (C.A.E.R.).

Il est significatif de noter qu'à l'époque où ces articles ont été préparés et présentés, les communications par satellites artificiels de la Terre n'étaient qu'un rêve de l'homme et pourtant, moins d'un an après, lorsque ce volume est sorti de presse, le satellite artificiel Telstar transmettait des signaux téléphoniques et télégraphiques à travers l'Atlantique. Si les résultats de l'expérience Telstar dépassent ce que l'on escomptait, sa réalisation n'aurait pas été possible sans des études détaillées du genre de celles qui sont exposées dans ce volume.

Tous ceux qui travaillent dans le domaine des communications par satellites trouveront dans ce volume une documentation précieuse.

Y. Y. MAO.

Space Radio Research Committee

BIBLIOGRAPHY

The attention of our readers is called on the following paper published on « Telecommunications Journal » vol. 30, n° 3 (March 1963), p. 77 :

« International Conference on satellite communication (London, November 1962) » by Y. Y. Mao, C. C.I.R. Engineer.

* * *

Symposium on space radio Communication (Paris, September 1961).

From the same journal, p. 80, a review by Y. Y. Mao on the U.R.S.I. monograph on Space Radio Communication.

Space radio communication, by G. M. BROWN (1).

This volume contains a collection of 37 papers, unabridged and some of them with summaries of discussions, presented in a symposium.

(1) One bound volume, pp. XII + 630, tables, diagrams, 23 × 15 cm. Published by Elsevier Publishing Company, 110-112 Spuistraat, Amsterdam, 1962. Price 70 Dutch florins.

sium held under the auspices of the International Radio Scientific Union (U.R.S.I.) in Paris, September 1961. This symposium was international in character, with participants of scientists and engineers from many countries and international organizations. Dr. E. Metzler, Director of the International Radio Consultative Committee (C.C.I.R.), and Mr. John H. Gayer, Member of the International Frequency Registration Board (I.F.R.B.), represented the I.T.U. in this symposium.

The contents of this volume is divided into eight sections, as follows :

1. Introduction.
2. Launching, attitude control and tracking of satellites.
3. Frequency allocation, interference and propagation problems.
4. Satellite equipment.
5. Ground equipment.
6. Modulation systems.
7. Specific communication systems.
8. Miscellaneous aspects.

From this list one can see that the many problems concerning the broad subject of satellite radio communication are treated in a detailed and thorough manner. Of particular interest to the I.T.U. are two papers by Capt. C. F. Booth and Dr. R. L. Smith-Rose, entitled « The international planning of satellite communication systems » and « The allocation of frequencies for experiments in space communications » respectively. They deal with co-ordination and interference problems, subjects certainly to be treated in the forthcoming Extraordinary Administrative Radio Conference (E.A.R.C.).

It is significant to note that at the time of preparing and presenting these papers, communication by artificial Earth satellites was a dream of mankind, yet less than one year afterwards, when this volume came out of press, the artificial satellite Telstar was actually spanning telephone and television signals across the Atlantic. While results of the experiment with Telstar were

much better than expectations, the whole thing would not have been possible without such detailed studies as expounded in this volume.

For those working in the field of satellite communication, this volume presents itself as a valuable reference book.

Y. Y. MAO.

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The U. S. A. National Aeronautics and Space Administration (N.A.S.A.), Office of Reliability and Quality Assurance, has issued the first annual volume (1961-1962) of « Reliability Abstracts and Technical Reviews ».

This volume contains 275 abstracts classified according to the following categories : general, statistical process control, sampling principle and plans, management of quality control, mathematical statistics and probability theory, experimentation and correlation, managerial application, measurement on control, reliability.

INTERNATIONAL YEARS OF QUIET SUN

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

MINUTES OF THIRD MEETING

The third meeting of the U.R.S.I.-C.I.G. Committee was held in association with the IIInd C.I.G.-I.Q.S.Y. Assembly in Rome over the period 18-22 March 1963.

The members of the U.R.S.I.-C.I.G. Committee constituted the nucleus of the Ionosphere Working Group for this Assembly, and several meetings were held at which the full ionosphere programme for the I.Q.S.Y. was reviewed. The detailed report of these meetings will be published separately in the *U.R.S.I. Information Bulletin* and in *I.Q.S.Y. Notes*.

In addition, meetings of the U.R.S.I.-C.I.G. Committee were held on March 21 and 22, 1963, at which business matters other than those relating to the I.Q.S.Y. were discussed. The following minutes refer only to these meetings.

The following members were present :

Prof. W. J. G. BEYNON (*Chairman*),

Mr. G. M. BROWN (*Secretary*),

Madame BENKOVA,

Prof. W. DIEMINGER,

Dr. C. O. HINES,

Dr. C. G. LITTLE,

Mr. W. R. PIGGOTT,

Dr. K. RAWER,

Mr. A. H. SHAPLEY,

Mr. J. VOGEL,

and Mlle G. PILLET represented the Secretary-General of U.R.S.I.

1. — PUBLICATIONS

(a) The Consultants for drifts and absorption, Dr. Rawer and Mr. Piggott respectively, reported on the present status of the I.G.Y.-I.G.C. data volumes to be published in the « Annals of the I.G.Y. ». The draft manuscripts were nearly complete and publication might be expected in about six months.

It was agreed that the drifts and absorption data should be published in one volume.

(b) Mr. Shapley reported that the monograph comprising the proceedings of the Symposium on Ionospheric Soundings in the I.G.Y./I.G.C., held in Nice in December 1961, had not yet been sent for publication. It was, however, hoped to complete the editorial work very shortly. The Chairman urged that every effort be made to effect publication of this volume by the time of the U.R.S.I. General Assembly in September next.

(c) There was some discussion of the future of the U.R.S.I. Manual of Ionospheric Stations. Mr. Brown reported that he had recently acquired all the details of the revisions and additions which had been collected by Mr. Beagley and Prof. Wright, and these would be incorporated into a supplement. Several members expressed the view that the Manual should be brought up to date to include, as far as possible, information on the I.Q.S.Y. stations, and it was agreed that the matter be left to the decision of the Chairman and Secretary in consultation with the Secretary-General of U.R.S.I.

(d) An earlier proposal to publish a revised Atlas of Scaled Ionograms was supported. It was understood that Dr. J. W. Wright was preparing the Atlas, and Dr. Little undertook to enquire if it could be published by the C.R.P.L., Boulder.

(e) After discussion, it was agreed that the proceedings of the various specialist symposia devoted to I.G.Y.-I.G.C. results which have been or are planned to be held provide the best forum for discussion of the interpretation of the results. No further action would therefore seem necessary on the preparation of separate « interpretative volumes », suggested at earlier meetings.

2. — OPERATION OF W.D.C.s

Dr. Dieminger, C.I.G. Reporter for Ionosphere, reported briefly on the decisions made at the Ionosphere Working Group meetings with regard to the operation of the World Data Centres. The recommendations of the Working Group were endorsed (for details, see full report of the Rome meeting to be published in the *U.R.S.I. Information Bulletin*).

3. — FUTURE OF WORLD WIDE SOUNDINGS COMMITTEE

Following a discussion of the future of this sub-committee the following recommendation was adopted by the Committee :

Since the World Wide Soundings Committee has essentially completed its original tasks, it is decided to revert to a less formal organization for the guidance of the vertical soundings programme. The responsibility for obtaining decisions and arranging for guidance or actions of primarily a scientific or technical nature is given to a « Consultant » for vertical soundings, who can seek advice as seems appropriate, including that of the members and consultants of the former W.W.S.C. The responsibilities of a more recordkeeping nature of monitoring for U.R.S.I. the conduct of the vertical soundings programme and of monitoring the actions taken in connection with the C.I.G.-I.Q.S.Y. and C.I.G. recommendations on data exchange and publications are given to W.D.C.-A for Ionosphere, acting under the guidance of the Consultant.

The W.W.S.C. as such is dissolved, but members and consultants are urged and expected to continue participation in the new and less formal framework. The accomplishments of the W.W.S.C. since its inception in 1955 have been outstanding and it has deservedly earned the gratitude of U.R.S.I., the I.G.Y. organization, and of all participants and users of the results for the vertical soundings programme.

It was unanimously agreed that Mr. W. R. Piggott be appointed the Consultant for vertical soundings within the framework outlined above.

It was also agreed that the two Sub-Committees of the W.W.S.C., on $N(h)$ profiles and on Ionosondes, should continue and should now become Sub-Committees of the U.R.S.I.-C.I.G. Committee and report to it through the Consultant for vertical soundings.

4. — SUB-DISCIPLINE CONSULTANTS

It was considered necessary to revise the list of sub-disciplinary reporters to the Committee, and the following list is considered to be effective from the date of this meeting, subject to the agreement of the individuals concerned and of the Executive Committee of U.R.S.I.

Vertical soundings : Mr. W. R. PIGGOTT.

Absorption A1 and A3 : Dr. K. RAWER.

Absorption A2 : Dr. C. G. LITTLE.

Drifts : Prof. R. W. H. WRIGHT.

Atmospheric radio noise : Mr. F. HORNER.

Whistlers and V.L.F. emissions : Prof. R. A. HELLIWELL ;
Dr. G. M. ALLCOCK.

Rockets and Satellites : Dr. H. E. NEWELL.

5. — MEMBERSHIP OF THE COMMITTEE

It was agreed to support the resolution of the Bureau of the C.I.G.-I.Q.S.Y. Committee, dated December 1962, that U.R.S.I. be invited to consider the addition of the following to the membership of the U.R.S.I.-C.I.G. Committee :

Dr. G. M. ALLCOCK (New Zealand).

Dr. T. R. KAISER (U. K.).

Prof. E. LAUTER (German Dem. Rep.).

Dr. P. M. MILLMAN (Canada).

Prof. R. W. H. WRIGHT (Jamaica).

In addition, it was agreed that Madame Benkova replace Dr. Pushkov.

6. — MEETINGS OF THE COMMITTEE IN TOKYO

One or two meetings of the U.R.S.I.-C.I.G. Committee have been tentatively scheduled during the XIV General Assembly of U.R.S.I. to be held in Tokyo in September 1963. Dr. Dieminger recalled that it would be necessary at this time to review the plans

for the I.Q.S.Y. for Whistlers and V.L.F. emissions, and for Oblique incidence and Back scatter observations, since it had not been possible to discuss these at the IInd C.I.G.-I.Q.S.Y. Assembly.

It was agreed that any other suggestions for the programme of these meetings should be sent directly to the Secretary.

Geoffrey M. BROWN,
Secretary.

5 April, 1963

Le texte français de ce compte-rendu sera publié dans le Bulletin n° 138.

Ionospheric Programme and Recommendations for the I.Q.S.Y.

**REPORT OF C.I.G.-I.Q.S.Y. WORKING GROUP V,
ROME, MARCH 1963**

Introduction

As in the I.G.Y., the ionospheric programme for the I.Q.S.Y. has been divided into sub-disciplines. The U.R.S.I.-C.I.G. Committee has designated « consultants » (sub-reporters) for each of these, as shown below. The work of each sub-discipline may be divided into two parts :

- (a) synoptic experiments,
- (b) special experiments.

Both categories are essential for the fulfilment of the I.Q.S.Y. objectives.

(a) MAJOR SYNOPTIC EXPERIMENTS.

VI : Vertical Incidence Soundings (W. R. PIGGOTT).

A : Ionospheric Absorption.

A1 Pulse-echo method (K. RAWER).

A2 Cosmic noise method (C. G. LITTLE).

A3 CW Field Strength (K. RAWER).

- D : Ionospheric Drifts (R. W. WRIGHT).
D1 Pulse echo fading.
D2 Radio meteor.
D3 Radio star scintillations.
- N : Atmospheric Noise Statistics (F. HORNER).
- W : Whistlers and V.L.F. Emissions (R. A. HELLIWELL, G. M. ALLCOCK).

(b) SPECIAL EXPERIMENTS.

Vertical Incidence Experiments.

- Special vertical soundings for regional studies.
Continuous recording of ionospheric characteristics.
Control for other ionospheric experiments, e. g. rockets ⁽¹⁾, absorption, drifts.
Scatter sounding.
Profile determinations ($N(h)$, $\nu(h)$) by partial reflection, cross modulation, and multi-frequency pulse or riometer techniques.

Oblique Incidence Experiments.

- Backscatter, fixed frequency (B1); multi-frequency (B2).
Auroral radar.
Forward scatter.
Oblique HF pulse transmissions.
Oblique CW, VLF and LF transmissions.

Atmospheric Radio Noise.

- Spectral distribution of radiated energy.
Sources of atmospherics.

Conjugate Point Experiments.

Satellite Experiments (H. E. NEWELL).

- Topside soundings.
LF and VLF reception.
Probes.

⁽¹⁾ The coordination of rocket and ground-based observations is very important. Workers involved are requested to consult R. W. Knecht, B. Hultqvist, or the U. S. S. R. Academy of Science.

Beacon transmitters : Faraday rotation and Doppler.

Moon echoes : Faraday rotation.

Rocket Experiments (H. E. NEWELL).

Studies of ionospheric and exospheric dynamics.

Jackson-Seddon dispersion experiments.

Medium frequency wave field experiments.

Probe experiments : Langmuir. RF resonance, ion trap.

Mass spectrometer.

Photometers : X-ray, Lyman α , u-v.

Topside soundings.

The objectives, programme, and detailed recommendations for each of the sub-disciplines are given below.

Vertical Incidence Soundings (V. I.)

1. — OBJECTIVES

The main objectives of the I.Q.S.Y. vertical sounding programme are :

- (a) To study diurnal, seasonal, and geographic variations of the principal ionospheric parameters deduced from vertical sounding data.
- (b) To study the solar cycle variations of the principal ionospheric parameters by comparing results obtained for the I.G.Y. and I.Q.S.Y. periods.
- (c) To compare vertical sounding observations with data obtained using rocket and satellite techniques.

An important feature of the I.Q.S.Y. observations will be an increased emphasis on the determination of electron density profiles on a regional and world-wide basis.

2. — OBSERVING PROGRAMME

2.1. — *Basic Programme.*

During the I.Q.S.Y. all stations should produce ionograms at least at quarter-hourly intervals. Timing should be such that the frequency of 3.0 MHz is reached at precisely the full hour U. T. or at multiples of 15 min. later. High latitude stations should, in addition, provide one low gain and one high gain ionogram at each hour.

2.2. — *Programme for R.W.D.s and Alerts.*

The designation of Regular World Days and Alerts is described in Annex I.

During Regular World Days and Alerts type COSMIC EVENT and MAGSTORM ionograms should be obtained at least at 5 min. intervals.

2.3. — *Programme for Eclipse Days.*

Continuous recording should be made at stations in the eclipse zone on Eclipse Days over a period from 2 hours before first contact to 2 hours after last contact, and observations at 5 min. intervals should be taken during the same hours over at least a period from 2 days before to 2 days after the Eclipse Day.

3. — IONOGRAM REDUCTION PROGRAMME

It is recommended that stations undertake reduction programmes A, B or D, depending on criteria such as latitude of station, the average accuracy of the ionograms, access to computing facilities, the programmes being undertaken at neighbouring stations, special regional plans, etc. It is recommended that stations notify the C.I.G. Reporter for Ionosphere of their tentative plans for reduction in order to achieve, by informal co-ordination, well-balanced reduction plans along the meridional chains of stations and within regions.

Attention is drawn to a new *f*-plot format (Annex III) recommended for use at stations with extended frequency ranges, and to the simplified method of calculating medians and quartiles brought into use since the I.G.C. (*U.R.S.I. Information Bulletin*, No. 120, pp. 81-82, 1960).

PROGRAMME A. — *For high latitude stations and representative stations at lower latitudes.*

- (a) Hourly values : f_oF2 , f_oF1 , f_oE , f_oEs , $fbEs$, $fmin$.
 $h'F$, $h'Es$; $h'E$ where height accuracy allows
M (3000) F2 or MUF (3000) F2
Es types
- (b) Some profile parameters (e. g. h_e , q_c) hourly on Regular World Days, or hourly monthly median profiles.
- (c) *f*-plots for all days.

PROGRAMME B. — *For temperate and low latitude stations.*

- (a) Hourly values : f_oF2 , f_oF1 , f_oE , f_oEs , $fbEs$, $fmin$.
 $h'F$, $h'Es$; $h'E$ where height accuracy allows.
M (3000) F2 or MUF (3000) F2.
Es types.
- (b) Some profile parameters (*e.g.* h_o , q_o) hourly on Regular World Days or hourly monthly median profiles.
- (c) f -plots for Alerts type COSMIC EVENT and MAGSTORM, and for Retrospective World Intervals type IONOMAGSTORM and INTERPLANET and, where possible, QUIET SUN (see Annex I).

Stations at places which have particular geophysical interest should produce f -plots for all days. In particular, it is hoped that organizations which operate many stations will select at least one to do programme A.

PROGRAMME D. — *Mainly profile programme.*

- (a) Hourly values : f_oF1 , f_oEs , $fbEs$, $fmin$, by direct scaling of ionograms.
 f_oF2 , f_oE , indirectly computed from the profile data.
M (3000) F2 or MUF (3000) F2 from direct scaling or computed data, as is most convenient.
Es types.
- (b) Hourly height profiles of electron density or plasma frequency ;
or hourly tables of electron density (or plasma frequency) with height ;
or hourly tables of height for constant electron densities for plasma frequencies.

4. — DATA FLOW TO W.D.C.s

Recommendations for the flow of data to W.D.C.s for the pre-I.Q.S.Y. period (1960-1963) are given in Annex II.

For the I.Q.S.Y. period at least one copy of the following data should be sent from every station to at least one W.D.C. It is,

however, understood that four copies of all duplicated material will be submitted. It is essential that W.D.C.s also receive all calibrations and scaling indications necessary for the use of the data.

- (a) Monthly tables of hourly values, medians, and quartiles of all the parameters listed in para. 3 above under the appropriate programme A, B or D, section (a).
- (b) Hourly tabulations of descriptive profile parameters, or hourly profiles, as listed in para. 3 above under the appropriate programme A, B or D, section (b).
- (c) *f*-plots as listed in para. 3 above under the appropriate programme A or B, section (c).
- (d) Copies of ionograms for Priority Regular World Days and Retrospective World Intervals type IONOMAGSTORM, INTERPLANET and QUIET SUN (See Annex I).
- (e) Lists of all other data which are not regularly interchanged (parameter or type of observation, and period).
- (f) A statement, at least quarterly, indicating dates and times of significant changes in frequency, height or timing calibrations, or in the sensitivity of equipment (in particular, changes which could affect *f*_{min} or *f*_{oE}s).
- (g) *h'*-plots or E-plots, if produced.

Data obtained from top-side soundings which can be used for studies of latitude and longitude variations should be deposited at a W.D.C. within a reasonable time. Copies of ionograms from top-side soundings obtained on Regular World Days should be sent to W.D.C.s.

5. — NEW TECHNIQUES

Although new techniques will form an essential part of I.Q.S.Y. ionospheric measurements, one of the primary objectives of the I.Q.S.Y. is to obtain data during the solar minimum period which can be compared with those obtained during the solar maximum of the I.G.Y. The use of new techniques and methods of data reduction should be compatible with this objective.

The importance of improving the performance of ionosondes used for ionization profile analysis is stressed, for example, by

improving height and frequency calibration and by extending the lower frequency limit at which echoes can be obtained.

Attention is drawn to the advantages of continuously recording ionospheric characteristics.

The importance is stressed of using top-side sounding satellites to obtain data on the spatial variations of the F layer ionization during the I.Q.S.Y. As data storage facilities are not likely to be incorporated into the early satellites it is important to increase the small number of existing telemetry stations.

6. — DISTRIBUTION OF STATIONS

6.1. — *General.*

Since a main purpose of the I.Q.S.Y. is to provide complementary data to the I.G.Y., it is recommended that the overall world coverage be not less than that during the I.G.Y.

It is particularly important that stations started since the last sunspot minimum operate during the I.Q.S.Y.

Responsible administrations are requested to inform the Consultant for vertical incidence (W. R. Piggott, Radio Research Station, Slough, Bucks, U. K.) of any new stations set up for the I.Q.S.Y., so that a complete list of active stations can be prepared and standard identification numbers and letters be assigned. It is very important that consistent systems of station identification and coding are used in the I.Q.S.Y. to facilitate the large amount of mechanical data handling.

Some preliminary details of operating stations will be published in « I.Q.S.Y. Notes » and supplemented as necessary. A final station gazetteer will be published at the end of the I.Q.S.Y. (see Resolution 14).

Having reviewed the prospective distribution of stations during the I.Q.S.Y., the Ionosphere Working Groups which met in Paris (1962) and Rome (1963) draw attention to the following considerations :

6.2. — *Meridional Chains.*

It is particularly important that the four meridional chains of stations, identified in the I.G.Y. programme, be as complete as possible during the I.Q.S.Y. Highest priority should be given

to completing the meridional chains by ensuring that observations are made at the following locations :

(i) 70°-80° W Chain (*the Americas*)

Panama-N. Columbia area. Large F-region electron density gradients occur in this general location and a station is needed to fill the gap of 15° in latitude between Bogota and Puerto Rico.

(ii) 10°-20° E Chain (*Europe, Africa*)

Tsumeb - an important station in the transition zone of the south equatorial chain.

Grahamstown - needed for East-West studies in an anomaly zone.

Marion Island - a station at this location would extend the chain to the south and also increase the coverage in the Antarctic region. This location is particularly important because it is conjugate to western Europe, where there is a high density of stations.

Tamanrasset - essential from both geographic and magnetic considerations.

Bangui - needed to define the equatorial trough in this zone.

Teneriffe - this proposed station would help define the big gap between Tamanrasset and Rabat, and is important to European-African communications.

Longyearbyen - extends the chain to the north and also provides important information about the secular movements of the auroral zone.

Leopoldville, Elizabethville, Bunia and Lwiro - the value of the chain would be very much reduced without these stations which are in an area important for the understanding of ionospheric behaviour around the southern maximum of f_oF_2 .

Zaria - this location is important for regional studies in conjunction with Ibadan, linking ionospheric and magnetic phenomena.

Togo - necessary to test the influence of dip in conjunction with data from Djibouti, Ibadan, and Zaria.

(iii) 70°-90° E Chain (*U. S. S. R., India*)

Dushanbe - an important station to complete this chain.

Ceylon - important for the study of longitude changes close to the magnetic equator.

(iv) 130°-150° *E Chain (Australia, Japan, U. S. S. R.)*

Hollandia (Kota Baru) - an important station south of the magnetic dip equator which gave valuable data in the I.G.Y.

Cebu - close to the magnetic dip equator in a region where the dip equator is furthest north of the geographic equator, and thus of special value in comparison with Huancayo.

Djakarta - full I.Q.S.Y. operation is most desirable since this location is close to the suspected position of one of the latitudinal peaks in ionization density.

North of Singapore - it would be most valuable if measurements were available from a station in latitude 10°-15° N in the longitude zone of Singapore for use jointly with Singapore data to define the transequatorial profile in this zone.

Khabarovsk - an important position in the gap between 45° and 62° N.

6.3. — *Antarctica.*

The I.Q.S.Y. represents the first opportunity for obtaining any appreciable information on the behaviour of the Antarctic ionosphere during a minimum sunspot period, and bearing in mind the extensive use already made of I.G.Y. data from this area it is obviously very important that as many as possible of the stations that were operated during and since the I.G.Y. be continued during the I.Q.S.Y. Whenever possible, stations which operated during I.G.Y., but which are not now active should be re-established for I.Q.S.Y. and in addition observations from some new sites would help solve scientific problems raised by I.G.Y. studies.

Syowa - data during the I.Q.S.Y. from this site would complement previous valuable measurements made during the I.G.Y.

Vostok - it is extremely important to obtain the solar cycle dependence of ionospheric parameters near the geomagnetic pole.

South Ice (about 80° S, 30° W) - data from this location would throw light on the physical mechanisms operating in the major Weddell Sea anomaly.

Maudheim - ionospheric observations at this station would help fix the eastern boundary of the Weddell Sea anomaly.

Roi Baudouin - an especially important location which contributed to the delineation of south polar ionospheric phenomena during the I.G.Y.

Sentinel Mts. - a station at this location would be valuable for (a) sub-auroral conjugate point studies, (b) additional ionospheric information in a region of Antarctica where marked spatial variations exist.

Dumont d'Urville - the proximity of the dip pole makes this station extremely important. The difficulties met by the French scientists are viewed with great regret and it is firmly hoped that these will be overcome in the short time remaining before the I.Q.S.Y. commences.

In addition to their invaluable contribution to the scientific experiments, ionospheric data from Antarctic stations, as recommended above, will contribute to the safety and efficiency of station and expedition operations, since almost no data exist for solar minimum on which to base radio propagation predictions for practical communications within Antarctica and to the outside world.

6.4. — *Floating Ice Stations.*

The floating Arctic ice stations operated during the I.G.Y. seem to have been successful where the severe technical difficulties were overcome. Complementary data for the I.Q.S.Y. from the area of the interior of the Arctic basin would be most valuable to the I.G.Y.-I.Q.S.Y. world geophysical experiment.

6.5. — *Magnetically Conjugate Pairs.*

The value of pairs of geophysical stations within 300 km of magnetically conjugate points is becoming increasingly apparent, operated either as synoptic stations or for short term experiments. Vertical soundings should be included in the programme for such conjugate pairs. It seems opportune to use existing stations as one station of each pair. A partial list of pairs which are certainly scientifically desirable and perhaps logistically practical includes :

| | |
|---------------------|-------------------|
| Byrd | Great Whale River |
| Lauder | Unalaska |
| Kerguelen | Salekhard |
| Mirny | Murmansk |
| South of France | Capetown |
| Vostok | Thule |
| Eights (Antarctica) | Quebec |
| South Pole | Frobisher Bay |
| McMurdo Sound | Shepard Bay |

6.6. — *Other New Stations.*

Easter Island - this seems the only possible practical location for a station in the Southeast Pacific Ocean. Data from this region are very desirable for morphological studies.

East Africa, Uganda, Kenya, Addis Ababa, Leyte (Philippines) - existing equatorial regional studies would be greatly assisted by additional stations near the dip equator.

6.7. — *Special closely-spaced chains.*

The existence of active cooperation between groups interested in equatorial problems is noted with satisfaction. Special and co-ordinated closely-spaced chains of equatorial stations are recommended for operation during the I.Q.S.Y.

As a result of I.G.Y. experience, it is realized that it is important to locate stations in such a way that studies can be made of phenomena occurring along the magnetic equator as well as across it. For example the study of temporal variations in the occurrence of equatorial Spread F would be greatly aided by a suitable triangular network of stations in order to resolve the directions of the equivalent drifts. Particularly suitable areas are in Peru, Ghana-Nigeria, Togo, and India-Ceylon.

6.8. — *Ocean Areas.*

In order to gain more information about the ionosphere over the large ocean areas it is recommended that greater emphasis be placed on the use of shipborne and airborne ionosondes. These are techniques which have matured during and since the I.G.Y. Soundings from research vessels at relatively fixed locations for extended periods (of at least one week's duration) would be most suitable. Observations from a moving ship or aircraft are also useful, for example for transequatorial F-region studies.

The possibility of using weather ships and other semi-stationary vessels as ocean ionosphere stations should be re-examined. It is not essential for the observations to be complete. For example, valuable information would be given by a single ionosonde for a particular weather ship station, providing data for about one-third of the total possible time.

7. — RECOMMENDATIONS AND REPORTS

The recommendations of the Ionosphere Working Group concerning vertical soundings will be found in the last section of this Report.

A supplementary manual for vertical soundings is being prepared which will include the programme of observations and reductions for the I.Q.S.Y., details of the new f -plot format for stations with extended frequency ranges, the simplified method of computing medians and quartiles, and a note on the logistics of computer calculations of medians and quartiles.

A two-letter code for ionospheric station identification has been prepared and will be published in the station list (para. 6.1).

Brief interim reports from the Sub-Committees on $N(h)$ profiles and ionosondes are given in Annexes IV and V respectively.

Absorption Observations (A)

1. — OBJECTIVES

The main objectives of the I.Q.S.Y. absorption programme are :

- (a) To study diurnal, seasonal, and solar cycle variations of absorption and their connection with local and worldwide magnetic activity.
- (b) To compare the absorption at different latitudes and longitudes and to determine the areas over which the absorption has the same characteristics.
- (c) To collate the changes in absorption with frequency and time with the variations of the ionization causing the changes.

2. — METHODS

The methods of measuring ionospheric absorption fall into the following main groups :

- A 1 Measurement of the amplitudes of pulses reflected from the ionosphere.
- A 2 Measurement of the absorption of extra terrestrial radio noise.

A 3 Measurement of the field strength of sky wave signals at short distance oblique incidence, on frequencies suitable for obtaining absorption data.

In addition, relative changes in absorption can be measured semi-quantitatively using ionogram parameters, in particular f_{min} .

The three methods do not give comparable data ; A 2 mainly measures absorption below about 70 km, whereas A 1 and A 3 mainly measure absorption above this level. Similarly, A 3 is less influenced by deviative absorption in the reflecting layer than is A 1.

In those cases where the full A 1 method cannot be undertaken, a simplified A 1 method may be used in which the amplitude of a gated pulse is recorded continuously. A description of this method will be found in the supplementary absorption manual.

The use of method A 2 for synoptic observations is described in the supplementary absorption manual. In the application of the A 2 method it is advantageous to use several widely spaced frequencies. Attention is drawn (i) to the value of essentially simultaneous separate measurements of the ordinary and extraordinary wave attenuations at the lower frequencies ; and (ii) to the possibility of improving high latitude coverage by using several low-elevation angle antennas at selected stations.

A description of an A 3 method suitable for new stations will be found in the supplementary absorption manual. A 3 measurements involve little effort to maintain and should be more widely used where manpower limitations preclude the use of method A 1.

3. — OBSERVING PROGRAMME

3.1. — *Method A 1.*

For A 1 measurements the programmes adopted during the I.G.Y. should be used in the I.Q.S.Y. These are, in the order of priorities :

(i) All stations should obtain noon absorption measurements for every day, observed on a minimum of two frequencies.

(ii) All stations should obtain night observations at least once per week using the same frequencies.

(iii) The diurnal variation of absorption should be determined for the interval from at least one hour before sunrise to two hours after sunset on Regular World Days, and when possible, during Alerts type COSMIC EVENT and MAGSTORM.

(iv) Stations in an eclipse zone should make continuous observations over a period from 2 hours before first contact to 2 hours after last contact on Eclipse Days. In addition, at least the 3 days centred on the Eclipse Day should be treated as Regular World Days.

(v) Measurements at times of constant solar zenith angle should be made whenever such measurements are possible.

Whenever possible, the absorption should be determined on a frequency of 2.2 ± 0.2 MHz. When only two frequencies are used, the second should be chosen according to the rules given in the Absorption Manuals. Where facilities are available it is desirable to make measurements on a group of frequencies so as to allow a fuller analysis of the frequency variations. It is important that an adequate sample of the amplitudes be obtained for each frequency (see Manuals).

Full details of the techniques will be found in the Absorption Manuals.

3.2. — *Method A 2.*

Continuous recording should be made on several widely-spaced frequencies, especially frequencies below about 20 MHz, during the I.Q.S.Y.

It is important that the sensitivity of the antenna and equipment be maintained constant over at least one year so as to provide adequate calibration data.

3.3. — *Method A 3.*

Continuous recordings should be maintained for as many hours as possible during each day.

For calibration purposes it is essential that recordings are available for times when E-region reflections are dominant at night.

3.4. — *Special Programmes.*

The importance of using methods A 1 and A 2, or A 3 and A 2, at the same station is stressed. The combined measurements

give much more information about the structure and behaviour of the D region than either taken alone.

It is recommended that special programmes be undertaken to study the structure of the D and lower E layer by combining absorption measurements on several frequencies preferably using A 1 and A 2, or A 3 and A 2 techniques with :

- (a) partial reflection techniques.
- (b) cross modulation techniques.
- (c) VLF measurements.
- (d) rocket measurements.

Experiments to study the geomagnetic cut-off for the cosmic radiation which generates the normal ionization at low heights in the ionosphere (e. g. by using method A 2) are desirable during the I.Q.S.Y.

4. — REDUCTION PROGRAMME

4.1. — *Method A 1.*

(i) Monthly tables of noon observations in one of the following forms :

- (a) *For one or two frequency programmes.* Tables for each frequency of absorption loss L in dB, sample count, and virtual height, together with monthly medians, median count and quartiles of L, and the calibration constants for the month.
- (b) *For multi-frequency programmes.* Tables of absorption loss L in dB for all frequencies, plus corresponding tables of virtual heights, together with monthly medians, median count and quartiles of L, and the adopted calibration constants for the month.

(ii) Summary of calibration constants.

(iii) Tables of hourly values of absorption loss L in dB for each frequency for Regular World Days, and Alerts type COSMIC EVENT and MAGSTORM. Where the data are available (e. g. from continuous recording) the corresponding hourly values for Retrospective World Intervals type INTERPLANET, IONOMAGSTORM and QUIET SUN (see Annex I) should be included. The tables should also show the monthly medians, median count and quartiles of L for each hour based on all the days listed.

(iv) Where continuous observations are available on Eclipse Days the absorption loss L in dB, and ionogram parameters f_{min} , $f_{min}2F$, ... should be tabulated at the shortest convenient intervals.

(v) Where observations are available at constant solar zenith angle the values of absorption loss L in dB should be tabulated for each day, together with monthly medians, median counts and quartiles.

4.2. — *Method A 2.*

Monthly tables of the mean absorption in dB for the first minute of every hour, together with monthly medians, median count, and quartiles (I.G.Y. Scaling Type I).

A clear distinction should be made between *provisional* values of absorption based on estimates of the sidereal variation of cosmic noise, and *final* values obtained after this variation has been determined from a year's observations. Provisional values should not be listed when final values are available.

4.3. — *Method A 3.*

(i) Monthly tables for each frequency of hourly values of the absorption in dB for the hours when E region reflections are dominant, together with monthly medians, median count and quartiles.

(ii) Similar tables of half hourly values for Retrospective World Intervals type INTERPLANET, IONOMAGSTORM and QUIET SUN.

5. — DATA FLOW TO W.D.C.s

Recommendations for the flow of absorption data to W.D.C.s for the pre-I.Q.S.Y. period (1960-63) are given in Annex II.

For the I.Q.S.Y. period at least one copy of the following data should be sent from every station to at least one W.D.C. It is however understood that four copies of all duplicated material will be submitted.

5.1. — *Method A 1.*

Tables as listed under para. 4.1, (i)-(v).

5.2. — *Method A 2.*

(a) Tables as listed under para. 4.2 in provisional and final form.

(b) Copies of records, together with the necessary calibration curves for Retrospective World Intervals type INTERPLANET, IONOMAGSTORM and RIOMETER (see Annex I).

5.3. — *Method A 3.*

Tables as listed under para. 4.3, (i) and (ii).

6. — DISTRIBUTION OF STATIONS

It is important that the stations which operated during the I.G.Y. continue during the I.Q.S.Y.

(a) *Equatorial latitudes.* — Absorption measurements obtained during the I.G.Y. indicate that considerable changes of absorption with longitude occur between Malaya and Africa. It is important that suitable similar measurements be made in other longitude zones, such as in South America.

(b) *Temperate latitudes.* — The existing distribution of A 1 stations in Europe and Asia is adequate. The situation in North America and in the southern hemisphere is not satisfactory. Since less accurate methods of measuring absorption can only be calibrated against A 1 - type data it is clear that some additional A 1 stations should operate during the I.Q.S.Y.

In this connection it is relevant to note that I.G.Y. data have shown that in the northern hemisphere between about 40° and 60° magnetic latitude abnormally high winter absorption in Europe or Asia was associated with relatively low absorption in America. It would be valuable to know whether a similar phenomenon occurs in the southern hemisphere, and modest A 1 or A 3 measurements would be sufficient for this purpose.

(c) *Sub-auroral and high latitudes.* — Although the intense absorption sometimes present during disturbed periods is best measured by the A 2 method, analysis of I.G.Y. data has shown that there are occasions when methods A 1 and A 3 detect changes

in absorption to which method A 2 appears relatively insensitive. It is therefore desirable that methods A 1 and A 3 should be employed at least at some stations, particularly in the Antarctic polar cap where no such observations have yet been made.

(d) It is strongly recommended that riometers (A 2) be used at magnetically conjugate points wherever this is possible.

| | | |
|-------|---------------------|-----------------|
| e. g. | Byrd | Great Whale |
| | Lauder | Unalaska |
| | Kerguelen | Salekhard |
| | Mirny | Murmansk |
| | Vostok | Thule |
| | Capetown | South of France |
| | South Pole | Frobisher Bay |
| | McMurdo Sound | Shepard Bay |
| | Eights (Antarctica) | Quebec |

Drift Observations (D)

1. — OBJECTIVES

The main objectives of the I.Q.S.Y. drift programme are :

- (a) To study diurnal, seasonal, and solar cycle variations of drifts and their connections with local and worldwide magnetic activity.
- (b) To interpret drift data obtained by different methods in order to gain a clearer picture of the relevant atmospheric phenomena. Intercomparisons of different methods at the same location are urgently needed.

2. — METHODS

2.1. — *Standard Methods.*

Measurements may be made by the following methods, which are mainly applicable at different height ranges :

- D 1 Fading intercomparison at three or more antennae spaced within a few wavelengths.
- D 2 Radio observations on drifting meteor trails.
- D 3 Radio star scintillation with three or more antennae spaced many wavelengths apart.
- D 4 Observations of characteristic reflection features at widely spaced sites.

It is not yet clear which features of the fading pattern are drifting with the ionospheric plasma.

It is important to compare results obtained by the application of the two main methods of record analysis, i. e. similar fades and correlation analysis, to the same samples of D 1 or D 3 records.

For Method D 2 it is important that the sensitivity of the equipment should be high enough to permit a satisfactory statistical coverage. This has not always been the case in the past.

There are advantages in measuring the drift at predetermined heights. For methods D 1 and D 4, this can be done if the operating frequency can be changed easily and quickly.

2.2. — *Intercomparison of Methods.*

There is need for detailed intercomparison of results obtained by the standard methods at the same locations. This can be achieved by using method D 1 on different frequencies such that echoes are obtained from the D, E, or F regions.

Special efforts should be made to compare the movements of artificial clouds (e. g. sodium clouds) in the ionosphere as observed by optical techniques with drifts obtained by methods D 1 or D 3 as appropriate.

Whenever possible optical observations of drifting meteor trails should be compared with results obtained by method D 2.

3. — OBSERVING PROGRAMME

Evaluation of I.G.Y. drift observations has shown that, in order to obtain satisfactory statistical results, it is necessary to have a large number of observations spread in time. It is therefore recommended that, during the I.Q.S.Y., drift observations should be made at least as follows :

(i) Observations on every Wednesday and Thursday, all Regular World Days, and all World Geophysical Intervals.

(ii) Observations should be made at least once an hour using a recording time which is long enough to give a representative sample of the fading pattern (typically 5-15 min.).

(iii) The height to which the drift corresponds should be determined as accurately as possible, and recorded with each observation.

(iv) Observations using method D 1 should be made so that as far as possible approximately equal numbers of drift results are obtained at each hour of the day for a given region.

(v) Where facilities allow it is recommended that observations be made on both the E-region and the F-region.

4. — REDUCTION PROGRAMME AND DATA FLOW TO W.D.C.s

(i) Hourly tabulations for all days listed in para. 3 of :
drift speed in m/s,
drift direction in degrees East of North,
corresponding height (whenever available).

(ii) Hourly tabulations as in (i) for the Retrospective World intervals INTERPLANET, IONOMAGSTORM and QUIET SUN (see Annex I) when recordings are available.

(iii) Where half-hourly drift data are available they should also be sent to the W.D.C. in the same form.

(iv) Reduced drift data for any other days should also be tabulated and sent to the W.D.C.

(v) Monthly medians of the hourly values of the North-South and East-West components of drift and median count. (When the median counts are small, three-hourly running medians should be substituted).

Note. — At least one copy of the above data should be sent from every station to at least one W.D.C.; if the material has been duplicated, four copies should be submitted.

5. — NOTE ON NOMENCLATURE

For methods D 1 and D 3, results obtained by the simple similar fade analysis should be designated by v^1 (speed) and ϕ^1 (direction). Results obtained by correlation analysis should be designated by v and ϕ .

Further details will be found in the *Annals of the I.G.Y.*, vol. III, part III, pp. 231-287, and in a supplementary drift manual which is being prepared.

6. — DISTRIBUTION OF STATIONS

No drift results have been obtained during the I.G.Y. from wide areas of the globe. Every effort should be made to establish drift stations in these areas.

The geophysical distribution of stations proposed for the I.Q.S.Y. is such that mapping should become possible for D 1 - type stations in Europe and Western Asia. To extend the coverage it is recommended that efforts be made to make observations in Africa between the Mediterranean Sea and the existing station at Ibadan.

It is recommended that drift observations be made at high latitudes in the Arctic and Antarctic, excluding the zone of maximum auroral activity (where observations are not practicable). A station near the magnetic dip pole, particularly in Antarctica, would be especially valuable for the physical interpretation of drift mechanisms.

Atmospheric Radio Noise (N)

1. — OBJECTIVES

The objectives of the work proposed for the I.Q.S.Y. are to :

- (a) Explain the generation of noise and evaluate the energy radiated from lightning discharges at all frequencies.
- (b) Describe quantitatively the distribution of the incidence of lightning discharges over the whole world, in statistical terms.
- (c) Compare the noise intensities at a number of receiving locations with conditions found during the maximum of the solar cycle.

2. — TECHNIQUES

Particular attention should be given to the accurate calibration of apparatus used for measuring integrated noise levels. Allowance should be made for the directivity of the receiving antenna. A rapid interchange of data between stations making such measurements should be arranged so that a continual comparison and check on accuracy may be made.

3. — OBSERVING PROGRAMME

Details of the programme of observations will be found in the *Annals of the I.G.Y.*, vol. III, part IV, pp. 295-314. Additional information will be published in the *I.Q.S.Y. Notes*.

It is recommended that effort should be concentrated on observations designed to provide information on the following items to extend the work performed during the I.G.Y. :

- (a) The statistical distribution of the incidence of lightning discharges. The extensive use of simple lightning flash counters would probably be suitable for this purpose.
- (b) The spectral distribution of the radiated energy.
- (c) The integrated noise level as carried out during the I.G.Y.
- (d) The waveform of atmospherics.
- (e) Noise measurements might well be extended into the ELF range. The theory that noise at these frequencies, measured at any station, is a good index of the total noise generated over the whole world, should be checked at several stations.
- (f) The importance of supporting rocket and satellite experiments by ground-based measurements is stressed.

4. — REDUCTION PROGRAMME AND DATA FLOW TO W.D.C.s

(i) Monthly tables for each frequency of hourly values of the noise level in dB above $1 \mu\text{V/m}$, together with medians, median count and quartiles.

(ii) Noise data, film records, and lightning count measurements as described in the *Annals of the I.G.Y.*, vol. III, part IV, pp. 313-14, with any future modifications as published in *I.Q.S.Y. Notes*.

5. — DISTRIBUTION OF STATIONS

The cooperation of the W.M.O. is invited for determining the statistical distribution of lightning flashes using lightning flash counters.

Work on the spectral distribution of the radiated energy should be extended to the tropics.

Whistlers and VLF Ionospheric Noise (W)

The current recommendations and programmes, published in *C.I.G. News*, No. 6, pp. 217-18, 1962, and *U.R.S.I. Information Bulletin* No. 134, pp. 82-85, 1962, will be reconsidered at the U.R.S.I. General Assembly at Tokyo in September 1963. Pending publication of the revisions, interested groups are requested to refer to the consultants :

Prof. R. A. HELLIWELL, Stanford Electronics Laboratories, Stanford, California, U. S. A.

Dr. G. M. ALLCOCK, Dominion Physical Laboratory, Private Bag, Lower Hutt, New Zealand.

Incoherent Scatter Sounding

The possibility of the use of incoherent scatter sounding, developed since the I.G.Y., offers an important means of studying the ionosphere and exosphere.

Stations in a position to function during the I.Q.S.Y. include :

Jicamarca, Peru (N.B.S., U. S. A.),

Arecibo, Puerto Rico (Cornell University, U. S. A.).

Stanford, California (Stanford University, U. S. A.).

Westford, Massachusetts (M.I.T., U. S. A.).

Nançay, France (C.N.E.T., France).

Malvern, England (R.R.E., U. K.).

All these stations will be able to measure density profiles and it is desirable that these measurements be compared with those obtained from conventional vertical soundings from below and other possible measurements of the upper ionosphere, especially topside soundings from satellites. It is also recommended that the times of measurements adhere to those adopted for conventional vertical soundings.

The spectrum of the scattered energy contains information on ionic temperature and mass, and on plasma inhomogeneities. It is recommended that these characteristics be measured systematically during the I.Q.S.Y., and the data compared with corresponding observations obtained by other methods.

Auroral Radar (R)

The continued study of aurorae by the radar echo technique is recommended. The data should be compared with those obtained from other methods of studying aurorae : see Report of Working Group IV, Aurora and Airglow.

Instructions will be found in the *Annals of the I.G.Y.*, vol. III, part IV, pp. 337-341.

The following auroral radar stations are expected to operate during the I.Q.S.Y. :

Australia : Tasmania.

Germany : Kühlungsborn, Lindau.

New Zealand : Invercargill.

U. K. : Sheffield, Halley Bay (Antarctica).

U. S. A. : Barrow (Alaska), Cold Bay (Alaska), College (Alaska), Kenai (Alaska), Kodice (Alaska), Pullman (Washington).

U. S. S. R. : Dixon Is, Murmansk, Tixie Bay, Mirny (Antarctica).

Forward Scatter (F)

During the I.G.Y. the metre wave links used at high latitudes provided important information on the occurrence and extent of abnormal absorption due to the incidence of corpuscles (P. C. A. events).

At middle latitudes the same techniques provide information on the ionized trails produced by meteors, the occurrence of sporadic E, and movements in the low ionosphere.

It is recommended that :

- (1) The efforts for the scientific use of practical links made during the I.G.Y. be continued and extended during the I.Q.S.Y.
- (2) An international cooperative effort be made to establish a VHF network in the Antarctic primarily to furnish information complementary to that provided by riometers.
- (3) Where possible VHF forward scatter circuits be set up having mid-points which are approximately conjugate in the North and South hemispheres.

Oblique Incidence and Back Scatter (OI)

The current recommendations, published in *C.I.G. News*, No. 6, p. 219, 1962, and *U.R.S.I. Information Bulletin*, No. 134, pp. 86-87, 1962, will be reconsidered at Lindau in May 1963. Revised recommendations will be published in the *I.Q.S.Y. Notes*. Pending publication of the revisions, interested groups are requested to refer to the Reporter for Ionosphere, Prof. W. Dieminger, Max-Planck-Institut für Aeronomie, 3411, Lindau, Germany.

Recommendations

WORLD DATA CENTRES

1. It is recommended that the existing World Data Centres A, B, C1 and C2 for Ionosphere continue to operate during the I.Q.S.Y. The Ionosphere Working Group recommended that the following responsibilities for data interchange between individual countries and W.D.C.s be adopted : Countries not possessing a W.D.C. for the ionosphere may request from one of the W.D.C.s copies of all relevant data listed in the Guide except those which are exchanged regularly through other channels : (1) Ionospheric data up to the equivalent of that given to the same W.D.C. by the requesting country may be claimed free of all charges. (2) If the request should be in excess of the equivalent, the actual cost of reproduction and postage for the excess material may be charged by the W.D.C.

2. It is recommended that for the pre-I.Q.S.Y. period (1960-1963) and for the I.Q.S.Y. period data should be sent to W.D.C.s according to the instructions given in this report and in the Guide to W.D.C.s.

3. It is recommended that there be sub-disciplinary special world centres for routine processing of data. These centres should work in close collaboration with the relevant sub-reporters (consultants). They should receive the data necessary for their work free of charge from the W.D.C.s Their minimum duties comprise the preparation of a summary publication of the observations and results obtained during the I.Q.S.Y. in a form which is comparable with that employed during the I.G.Y. Proposals

to establish such special world centres should be made to the Reporter for Ionosphere. Decisions on the number and location of these special world centres will be made by the Reporter with the approval of the C.I.G.-I.Q.S.Y. Bureau.

RETROSPECTIVE WORLD INTERVALS

4. It is recommended that Retrospective World Intervals be designated for the I.Q.S.Y. to include types INTERPLANET, IONOMAGSTORM, QUIET SUN, and RIOMETER, provided that the number of these per year applicable to each sub-discipline does not exceed about five.

5. It is recommended that responsible organizations take all possible steps to transmit to W.D.C.s all data listed in this report which is required for Retrospective World Intervals as soon as possible after the designation of these intervals.

INSTRUCTIONS AND PROGRAMME FOR THE I.Q.S.Y.

6. It is recommended that the analysis procedures to be used in the I.Q.S.Y. for vertical soundings shall be those given in the « U.R.S.I. Handbook of Ionogram Interpretation and Reduction », supplemented where necessary by the instructions given in the *Annals of the I.G.Y.*, vol. III, part I. Where the two texts disagree, the former is to be used.

It is recommended that the programmes of observation, reduction, and data flow to W.D.C.s be as given in this report.

7. It is recommended that the instructions for absorption measurements of types A 1, A 2, and A 3 to be used in the I.Q.S.Y. shall be those given in the *Annals of the I.G.Y.*, vol. III, part II, together with the relevant sections in the Absorption Supplementary Manual.

It is recommended that the programmes of observation, reduction and data flow to W.D.C.s be as given in this report.

8. It is recommended that the instructions for drifts measurements to be used in the I.Q.S.Y. shall be those given in the *Annals of the I.G.Y.*, vol. III, part III, together with the relevant section in the Drifts Supplementary Manual.

It is recommended that the programmes of observation, reduction, and data flow to W.D.C.s be as given in this report.

9. It is recommended that the instructions for atmospheric radio noise, whistlers and VLF emissions, back scatter, forward scatter, and radar aurora to be used in the I.Q.S.Y. shall be those given in the *Annals of the I.G.Y.*, vol. III, part IV.

10. It is recommended that the I.Q.S.Y. programmes of observation, reduction, and data flow to W.D.C.s be reproduced in the Ionosphere Supplementary Manuals, and any subsequent instructions and recommendations be published in the *I.Q.S.Y. Notes*.

11. It is recommended that vertical incidence stations notify the C.I.G. Reporter for Ionosphere of their tentative plans for reduction of data so that these can be coordinated for the meridional chains.

12. It is recommended that stations with extended frequency ranges adopt the new f -plot format described in this report.

ROCKET AND SATELLITE EXPERIMENTS

13. The importance of correlating rocket and satellite data with corresponding information obtained by ground based methods is stressed, and it is recommended that every effort be made to obtain simultaneous ground based observations to compare with rocket measurements of such parameters as ionization densities, temperatures, collision frequencies and drifts.

STATION LISTS

14. It is recommended that lists of operating stations be published in the *I.Q.S.Y. Notes* for each of the sub-disciplines. These should include : station name, geographic coordinates, geomagnetic coordinates, angle of dip, magnetic latitude, time meridian used, code letters and cross reference to the C.S.A.G.I. identification number and the standard 3-digit code number. Additions and corrections should also be published in the *I.Q.S.Y. Notes*.

Final lists should be prepared at the end of the I.Q.S.Y. which give, in addition to the above information, the programme actually

carried out, months for which data are available, brief statement of additional data available at the station, and address of the responsible organization.

DISTRIBUTION OF STATIONS

15. It is recommended that special efforts be made to establish vertical incidence, absorption, drifts, lightning counter and noise stations as set out in this report.

16. It is recommended that special efforts be made to set up stations near conjugate points, in particular for vertical incidence, absorption A 1 and A 2, and whistler and VLF emission experiments.

17. It is recommended that participating I.Q.S.Y. Committees planning ionospheric experiments from ocean research vessels coordinate their plans through the Reporter for Ionosphere so that, as far as possible, the ocean measurements will be coordinated in time and location.

18. It is recommended that greater emphasis be placed on the use of shipborne and airborne ionosondes. Even parttime deployment would be valuable.

19. It is recommended that the authorities concerned be urged to set up a vertical incidence station in Ceylon.

20. It is recommended that special efforts be made to provide suitable staff for the operation of the equatorial African ionospheric stations, in particular Bunia and Elisabethville. The attention of U.N.E.S.C.O. is drawn to this matter.

21. It is recommended that the authorities concerned be urged to reopen the ionospheric station at Kota Baru (Hollandia) which provided valuable data for the I.G.Y. and is an important station in the 150° E longitude chain.

22. It is recommended that efforts be made to establish a drifts station near the south magnetic dip pole for studies of the physical interpretation of drift mechanisms.

SPECIAL PROGRAMMES

23. It is recommended that the structure of the lower ionosphere be studied by combining absorption measurements on

several frequencies with measurements by partial reflection, cross modulation, VLF and rocket techniques.

24. It is recommended that results obtained at the same locations by the standard drift methods be intercompared, and related to movements detected optically, e. g. by using artificial clouds or meteor trails.

ANNEX I

World Days and Intervals

The definitions of the days marked on the International Geophysical Calendar, Alerts, and Retrospective World Intervals will be found in the report of Working Group I on World Days.

Alerts.

During the I.Q.S.Y. the extended programme of observations formerly associated with S.W.I.s should commence with the receipt of an Alert type COSMIC EVENT or MAGSTORM. This applies to the three classes of Alert « expected », « just started », and « exists ».

The programme should continue for 24 hours only after the receipt of each message Alert type COSMIC EVENT or MAGSTORM. The Alerts type MAGCALME, SOLACTIVITY, SOLFLARE, SOLCALME, and STRATWARM are of interest to individual stations, but are not to be regarded as alerts demanding the extended programme at all stations.

Retrospective World Intervals.

The following types of Retrospective World Intervals are suitable for ionospheric purposes : INTERPLANET (cosmic ray flux increases and associated phenomena), QUIET SUN (quiet solar and geophysical conditions), IONOMAGSTORM (ionospheric and magnetic storm), and RIOMETER (special A 2 intervals).

The selection of suitable periods will be made by a small panel of experts for each type of interval. The following names are suggested as ionospheric experts, subject to their agreement and availability :

INTERPLANET : C. G. LITTLE.

QUIET SUN : A. H. SHAPLEY.

IONOMAGSTORM : C. G. LITTLE ; W. R. PIGGOTT.

RIOMETER : C. G. LITTLE, B. HULTQVIST, DRIATSKY.

ANNEX II

Data Flow to W.D.C.s for the PRE-I.Q.S.Y. period

It is recommended that for the pre-I.Q.S.Y. period (1960-1963) the following data should be sent to at least one W.D.C. :

Vertical soundings data.

- (a) Monthly tables of hourly values and medians for the following four characteristics f_oF2 , $M(3000)F2$, f_oEs , $fbEs$ (this concerns all stations).
- (b) f -plots and copies of ionograms for retrospective intervals of a few days to be designated by the Reporter for Ionosphere (this concerns all stations).
- (c) Monthly tables of hourly values for all characteristics which are interchanged (this concerns only stations producing station booklets).

Absorption data.

- (a) Data obtained with methods A 1 or A 3 according to the I.Q.S.Y. rules (see this report) wherever available.
- (b) Monthly tables of hourly values of attenuation (in dB) obtained with method A 2, wherever available.

Drifts data.

No exchange recommended.

Atmospheric Radio Noise data.

Monthly tables for each frequency of hourly values of the noise level (in dB).

ANNEX III

The Format of f -Plots

Existing standards.

The standard f -plot form used during the I.G.Y. provides a frequency and time grid suitable for plotting quarter-hourly, or in a few cases, ten minute, observations. The frequency scale is linear from 0 to 10 MHz and logarithmic from 10 to 25 MHz. Some stations, where the top frequencies never reach these high values, use scales which stop at 15 or 20 MHz.

The standard form uses a scale of 15 mm per MHz from 0-10 MHz. At higher frequencies the ordinate y in cm is related to the frequency f in MHz by the equation :

$$y = 34.54 \log_{10}(f) - 19.54$$

This gives a continuous scale at 10 MHz. The standard time scales may vary slightly, most giving between 8 and 9 mm per hour for quarter-hourly recording or about 10 mm per hour for 10 minute recordings. Smaller spacing gives plots which cannot be effectively reproduced.

The frequency scale has heavy rulings at MHz intervals and is subdivided into 0.1 MHz steps below 15 MHz and 0.2 MHz steps above this frequency. The time scale has heavy rulings every hour and is subdivided to give one line per observation, i. e. to give 4 lines per hour for quarter-hourly observations.

A small subsidiary scale is added on or at the top or bottom of the f -plot to show the incidence of Es types. This graph normally contains 5 to 8 horizontal lines spaced about 3 mm apart.

Experience shows that this format is very satisfactory provided care is taken to make any entries, particularly line entries, sufficiently thick to be distinguished from the grid when reproduced. This requirement has not been adequately observed at some stations.

Recommendation.

It is recommended that no changes in this format be made at stations which are using equipment comparable with that in use during the I.G.Y. For stations with extended low frequency ranges, down to say 200 kHz, some modifications in the format and f -plot reduction rules may be desirable to obtain the full advantage from the extended frequency ranges. A suitable new standard is described below. This may be adopted instead of the old standard where the quality of the low frequency ionograms and the amount of additional data justify a change. In doubtful cases, it is recommended to keep to the current practice at the station so as to simplify comparison with I.G.Y. data. The existing format is adequate for equipments starting near 0.7 MHz.

A new f-plot format for stations recording on frequencies below 1 MHz.

It is desirable that the new *f*-plot sheets should be, if possible, the same size as the existing standard but that the scale below 1 MHz should be more open. Since data are not likely to be obtained, on the average, for more than half the time on frequencies below 1 MHz, it is possible to make a compromise between convenience of plotting and space required. It is important that the spacing in that part of the *f*-plot which is used the most (i. e. 2-8 MHz) should not be appreciably smaller than that provided at present. This suggests doubling the spacing near 1 MHz and using a geometrically progressing variation starting at a lower frequency than at present.

A suitable scale can be constructed starting at 0 MHz with an interval of 3 mm per 0.1 MHz, and decreasing geometrically to 1.5 mm per 0.1 MHz at 1.5 MHz. The common multiplier is 0.953. The remainder of the *f*-plot is identical with the standard I.G.Y. form except that the highest frequency is restricted to 23 MHz.

A simpler alternative, which has the disadvantage that the frequency scale is not continuous, is to use 3 mm per 0.1 MHz from 0 to 1 MHz and then the standard scale. If this scale is used a heavy line should be drawn across the chart at 1 MHz.

Additional rules for frequencies below the gyrofrequency.

A heavy line should be marked on the *f*-plot at the mean gyrofrequency f_H calculated to the nearest 0.1 MHz for a height $h = 110$ km from the standard equation :

$$f_H = (r_0/(r_0 + h))^3 \cdot (eH_0/mc)$$

where H_0 is the total field at ground level in gauss and r_0 is the radius of the earth.

The following conventions should be used in the frequency band below the gyrofrequency in place of the standard conventions :

- *f*min lowest frequency at which any echoes are observed (no rejection rules).
- *f*min F except when equal to the critical frequency of a lower
- layer, when use -○-.

- o any ordinary mode critical frequency or cusp frequency.
- z any z - mode critical frequency.
- x any cusp in a trace attributable to a maximum or a minimum in the ionization profile below the reflecting layer not already denoted by o .
- foEs.

The distinction between *o* and *x* depends on the presence or absence of retardation in the trace of the lower layer. Thus if both lower and upper traces show retardation at the critical frequency and the upper layer is effectively blanketed by the lower near this frequency use *o*. When it is clear from the sequence of events that the cusp is due to the formation of a ledge in the F layer, e.g. near sunrise and sunset, the symbol *o* is used and the critical frequency tabulated with the values for the appropriate layer. Care is needed to distinguish between *foF1* and *foE* when the ledge first appears in the morning.

When the magneto-ionic modes are closely coupled, additional retardation occurs in the *x* mode when the working frequency is equal to the plasma frequency. Thus a complex magneto-ionic wave often shows retardation at frequencies where the underlying ionization has a maximum or minimum. The symbol *x* is introduced to denote maxima due to this phenomenon.

ANNEX IV

Interim Report from the N(h) Profile Sub-Committee (Provisional)

(Chairman : Dr. J. W. WRIGHT)

The following viewpoints have been expressed :

1. A truly definitive N(*h*) method does not yet exist.
2. Most present methods can give good results in some cases or some parameters, just as they can give very wrong results in other cases.
3. There do not exist adequate tests in most methods, for determining whether a given calculation is right or wrong.
4. Most ionograms are not of sufficient quality for the few tests of profile accuracy that are available.

5. The value of individual profiles calculated and published as part of a routine programme is questionable.

6. It is possible that the « median profiles » derived from the median of the virtual height curves for the quiet days in a month at a given hour may provide the best programme for general use during the I.Q.S.Y. King's « composite virtual height method » is being used at a number of NBS operated stations.

7. It is important that as many as possible of the ionograms obtained during the I.Q.S.Y. be suitable for more accurate individual $N(h)$ analysis. The improvements necessary include the following :

- (a) Observation of the nighttime E layer (necessitating a lower frequency limit than that presently available on many ionosondes).
- (b) Better sensitivity, particularly in the vicinity of critical frequencies. This might be achieved, in some cases, through the use of slower sweep times and consequently improved signal/noise integration.
- (c) Improved height and frequency resolution on the ionogram.

ANNEX V

Interim Report from the Ionosonde Sub-Committee

(Chairman : Prof. K. RAWER)

In response to a detailed questionnaire on ionosondes a list of the technical performance of all existing ionosondes has been widely circulated. Whilst similar viewpoints were expressed on most points, clearly different views were held in a few cases, notably with regard to receiver and recorder performance.

During the U.R.S.I. Symposium in Nice in December 1961, working groups were formed on antennae, general design problems and modern receiving techniques. It was concluded that although most current development seems to be converging, there is no doubt that future development will probably be less conventional and will largely use semiconductors. It seems, therefore, unwise to consider *technical* standardization based on present techniques.

On the other hand, the standardization of ionograms seems possible. This would have the great advantage that records from many different stations could be used for scientific work without changing projectors, scales, etc. It appears that at present at least half of the working time of research workers at W.D.C.s is spent in such changes. Thus the scientific interchange would be greatly facilitated if recording scales could be standardized.

For routine records there appears to be general agreement, based on sound scientific reasons, in favour of :

- (a) a logarithmic frequency scale,
- (b) a linear height scale,
- (c) photographic recording on standard 35 mm film.

Discussions are continuing by correspondence, with a view to agreement, before the I.Q.S.Y., on definite numerical laws for the frequency and height scales. These would not necessarily mean a standard format for all ionograms, the different frequency ranges used at present could be continued. But if agreement is reached many ionosondes with logarithmic frequency scales could be used with the same projectors and scales.

The present list of ionosonde performance details will be revised and published. Information on the type of ionosonde used at any station should be included in the I.Q.S.Y. list of ionospheric stations, together with details of the type of antenna used during the I.Q.S.Y. It is planned to prepare a detailed description of the main sounding antennae in use, so as to provide working instructions for antennae constructors.

Le texte français du présent document sera publié dans le Bulletin n° 138.

Symposium on Equatorial Aeronomy

LIMA, PERU, AUGUST 1962

RECOMMENDATIONS FOR I.Q.S.Y.

The attention of Members of Commission III, of the U.R.S.I./C.I.G. Committee and of the World Wide Sounding Committee should be drawn more particularly to Recommendations 7, 16 and 19.

The First International Symposium on Equatorial Aeronomy

(1) Notes with gratification the programme of research recommended for equatorial regions included among the proposals of the Paris Meeting of the C.I.G.-I.Q.S.Y. Committee; and will do its utmost to assist in carrying out the programme.

(2) Further notes with pleasure that several of the national programmes for the I.Q.S.Y. include the *establishment or reactivation of magnetic observatories along the magnetic dip equator*, and also that progress is being made toward the establishment of anchored magnetic recorders to provide data recording in deep oceans. This Symposium calls attention to the need for additional land observatories, recommending particularly the establishment of three new observatories to close remaining gaps, one near Natal, Brazil, one in the Southern Philippines, and one south of the Isthmus of Kra, in Thailand, each as close as possible to the dip equator. Such stations would prove of great value in answering questions raised by the significant disparity existing between phenomena registered at Huancayo and at the African equatorial stations, and likewise between Koror and the equatorial stations in the south of India.

(3) Invites the attention of the I.Q.S.Y. planning bodies to the *need for additional stations to be situated to the north and south of selected equatorial stations*.

(4) Draws the attention of the C.I.G.-I.Q.S.Y. Committee to the importance of accurate ground surveys of magnetic elements which are required for the interpretation of satellite measurements of the magnetic field.

(5) Stresses the great advantages which would be derived from complementary satellites (simultaneous polar orbit satellites with their orbital planes at 90° to each other) in work on the earth's magnetic field,

(6) Notes that there is no internationally agreed system to provide a uniform calibration procedure for micropulsation equipment, and it recommends that steps be taken to agree on such a procedure, otherwise there can be little comparative study of a quantitative nature in this field.

(7) Calls attention to the *need for additional ionospheric stations at the dip equator* in the following regions :

- (a) Southern Philippines,
- (b) Between Huancayo and Natal (Brazil),
- (c) Between West Africa and Addis Ababa,
- (d) Near Trivandrum, India.

(8) Draws the attention of the C.I.G.-I.Q.S.Y. Committee to the present difficulties of some of the stations in equatorial Africa, in particular, *Bunia, Lwiro and Leopoldville*, and would recommend that *specific support* (and *personnel, where necessary*), *be made available* so that those stations which comprise an important part of the African chain of stations, will be able to carry out a full programme during I.Q.S.Y.

(9) Calls attention to the need for the establishment of *more ionospheric stations for use in transequatorial studies*. Where possible, these should be situated in sectors centred approximately on the meridians 75° W, 5° E, 80° E, and 140° E, where a number of stations are already located. *A third meridional chain would be desirable close to the 40° E meridian.*

(10) Points out to the C.I.G.-I.Q.S.Y. Committee that ionospheric sounders *in equatorial regions* can obtain additional data of considerable importance to *studies of the lower ionosphere* if the ranges of their sweeps were modified so as to commence at 0.25 Mc/s.

(11) Recommends that steps should be taken to revise and *clarify the classification of the types into which sporadic E configurations* have been divided in the analysis of ionograms. In particular, it is felt that *blanketing types of sporadic E need to be distinguished.*

(12) Stresses the importance of propagation studies along the magnetic equator, and hopes that the C.I.G.-I.Q.S.Y. Committee will urge that efforts be made to carry out such studies.

(13) Points out that *cross-modulation studies of the equatorial D region* would fill a large gap in our present knowledge.

(14) Suggests that results of considerable value could be obtained by making *observations of ionospheric drifts, Es, spread-F and other ionospheric phenomena* at stations which are located *at magnetically conjugate points*.

(15) Indicates the need for further equatorial studies of irregularities in both the *E* and *F* regions by radar techniques (preferably at several frequencies simultaneously).

(16) Recommends that combined ionospheric and magnetic studies be made by the *use of rockets in the equatorial R, E and F regions*, and stresses that such studies should always be made in association with similar intensive observations from the ground. The possibility of creating irregularities in the equatorial electrojet by grenade explosions should be examined.

(17) Urges that scintillation measurements of satellite signals should be encouraged in equatorial regions. The provision of a beacon satellite orbiting in a plane inclined at 10° to the geographic equator would be extremely helpful in such studies.

(18) Recommends the installation of a coronagraph by the Geophysical Institute of Peru for the correlative study with the other observations of the sun.

(19) Finally, the Symposium strongly recommends *that all stations near the magnetic equator should be instrumented with both magnetic and ionospheric recorders*. The importance of simultaneous observations by both techniques is much greater than the significance of either observation alone.

Greece

The Greek National Committee has constituted for the International Years of the Quiet Sun a Technical Working Group under the following scheme :

Prof. Michael ANASTASSIADES, President.

Prof. Leonidas CARAPIPERIS, Member.

Dr. Demetrius ILIAS, Member.

IUWDS

World Data Centres

The Radio Research Station, Slough, Bucks., England has issued the « Catalogue of Data Received up to 31st January 1963 ».

SYMPOSIA

Symposium on Electromagnetic Theory and Antennas

(COPENHAGEN 1962)

PROCEEDINGS

During the week of June 25-30, 1962, a very successful symposium was held in Copenhagen, Denmark, under the auspices of the International Scientific Radio Union. Professors J. Rybner and H. L. Knudsen, of the Technical University of Denmark, were president and secretary of the symposium, respectively, and Professor J. R. Wait was chairman of the technical program. A number of Danish firms and institutions provided generous financial support. This was the fourth of a series of electromagnetic symposia. The previous three were at McGill University in 1953, University of Michigan in 1955, and at the University of Toronto in 1959. The proceedings of the latter two symposia have appeared as special issues of the P.T.G.A.P. Transactions.

Many of the papers presented at Copenhagen are to appear in a forthcoming book entitled *Electromagnetic Theory and Antennas*. This is to be a volume of Pergamon Press' new series on Electromagnetic Waves. This collection of papers was edited by a Committee under the chairmanship of Professor E. C. Jordan.

The 121 papers submitted to the meeting and published are classified under the following headings :

- A. Scattering and Diffraction Theory.
 - B. Anisotropic and Stratified Media.
 - C. Random Media and Partial Coherence.
 - D. Surface Waves, Leaky Waves and Mode Propagation.
 - E. Antenna Theory and Radiating Elements.
 - F. Antenna Arrays and Data Processing.
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INTER-UNION COMMITTEES

Inter-Union Committee on the Ionosphere

Letter from the U.R.S.I. Secretary General

Dear Colleague,

You will find herewith enclosed the Agreement for the constitution of the Inter-Union Committee (Appendix I) as adopted at the end of 1959 by the three constituent Unions, namely I.A.U., I.G.G.U. and U.R.S.I.

It was then suggested to appoint an « ad hoc » Committee to nominate the future membership under the leadership of Sir Edward V. Appleton, Chairman of the previous Mixed Commission on the Ionosphere. Besides Sir Edward Appleton the following were appointed as members of the « ad hoc » Committee :

Prof. BEYNON for U.R.S.I.,

Dr. PAWSEY for I.A.U.,

Mr. NICOLET for I.G.G.U.

(The constitution of the Committee took about six months correspondence).

The nominees of the « ad hoc » Committee were as follows :

U.R.S.I. : W. J. G. BEYNON, K. MAEDA, J. A. RATCLIFFE, T. E. VAN ZANDT.

I.A.U. : C. W. ALLEN, O. KIEPENHEUER, J. L. PAWSEY and a U. S. S. R. representative.

I.G.G.U. : J. BARTELS, D. R. BATES, H. FRIEDMAN, M. NICOLET.

U.R.S.I. representatives have been confirmed ; due to the death of Dr. Pawsey, I.A.U. has brought some modifications to the list suggested by the « ad hoc » Committee. The final membership of the Inter-Union Committee is given in Appendix II.

From what I have gathered from some correspondence and letters I have received, I understand that the Inter-Union Committee will meet in Tokyo immediately before the forthcoming General Assembly of U.R.S.I. (September 9-20, 1963).

cc : Sir Edward APPLETON
Dr. D. H. SADLER
Mr. G. LACLAVÈRE
26 February 1963

Yours sincerely,
HERBAYS,
Secretary General

APPENDIX I

Agreement for the Constitution of an Inter-Union Committee on the Ionosphere

1. The International Astronomical Union (I.A.U.), the International Union of Geodesy and Geophysics (I.U.G.G.) and the International Scientific Radio Union (U.R.S.I.) agree to constitute an Inter-Union Committee on the Ionosphere as a successor to the former Mixed Commission on the Ionosphere.

2. U.R.S.I. shall act as Parent Union for this Committee.

3. The membership of the Committee shall consist of twelve members, four being appointed by each of the constituent Unions. The appointments by each Union shall be reviewed at intervals of not more than three years.

4. The Chairman, the Vice-Chairman and the Secretary of the Committee shall be elected by the members for a term of three years, with the proviso that they should all be representatives of different constituent Unions. The Officers are eligible for immediate re-election, but normally they may not serve more than two consecutive terms.

5. The Committee is empowered to appoint consultants; their number should not exceed six and their appointment should be approved by at least two of the constituent Unions.

6. The Chairman of the Committee may, on his own authority, invite to the meetings observers from other international scientific agencies.

7. The Committee will meet at least every three years. Each meeting will be organized, by agreement between the Unions concerned, under the supervision of one of them. Such a meeting will be held in close association, but not overlapping in time, with a General Assembly of that Union.

The Committee is encouraged to organize symposia at other times, subject to the approval of the financial arrangements by the Parent Union.

8. Resolutions and recommendations adopted by the Committee during its meetings should be communicated to the Secretaries General of the constituent Unions for endorsement of each of the Unions before any final action be taken.

9. At least two months in advance the Secretary should circulate agenda and other relevant papers. After each meeting he should send a summary report to the Secretaries General of the three Unions.

10. Publication of the proceedings of the meetings and symposia will be arranged by the Secretary General of U.R.S.I. after consultation of the Secretaries General of the two other Unions.

11. The three Unions will provide each a yearly contribution of \$ 100 to support the expenses of the Committee. The fund thus constituted will cover :

- (i) the secretarial expenses of the Committee.
- (ii) the travelling expenses (partly or totally) of the Chairman, the Vice-Chairman and the Secretary for meetings of the Committee.

12. The Committee should submit to the Parent Union estimates of the costs of symposia. The Parent Union, through arrangements with the two other Unions and other agencies, will assume responsibilities for financial support of meetings and symposia in accordance with budget approval by its Board of Officers.

13. The Secretary of the Committee will communicate annual statement of income and expenditure on behalf of the Committee to the Secretary General of U.R.S.I. who will send a full statement to the Secretaries General of the two other Unions.

14. At its first session the Committee will define its terms of reference and draft a programme of action for further endorsement by the relevant bodies of I.A.U., I.U.G.G. and U.R.S.I.

15. Any dispute within the Committee will be settled by a meeting of the Presidents of the three Unions. Arbitration, if necessary, will be provided by I.C.S.U.

APPENDIX II

Inter-Union Committee on the Ionosphere

Membership

U.R.S.I. : Prof. W. J. G. BEYNON, Department of Physics,
University College of Wales, Aberystwyth, Cards.,
United Kingdom.

Prof. K. MAEDA, Institute of Electrical Engineering,
Faculty of Engineering, University of Kyoto, Sagyo-
ku, Kyoto, Japan.

Mr. J. A. RATCLIFFE, Radio Research Station, Ditton
Park, Slough, Bucks, United Kingdom.

Dr. T. E. van Zandt, Central Radio Propagation
Laboratory, National Bureau of Standards, Boulder,
Colorado, U. S. A.

I.A.U. : Prof. C. W. ALLEN, University of London Observatory,
Mill Hill Park, London N. W. 7, England.

Prof. R. N. BRACEWELL, Radio Astronomy Institute,
Stanford University, Stanford, California, U. S. A.

Dr. V. G. FESENKOV, Astrophysical Institute, Alma Ata,
U. S. S. R.

Dr. K. O. KIEPENHEUER, Fraunhofer Institut, Schöneck-
strasse 6, Freiburg i. Br., Germany.

I.G.G.U. : Prof. J. BARTELS, Geophysikalisches Institut der
Universität Göttingen, Herzbergerlandstrasse 180,
Göttingen, Germany (1).

(1) Subject to approval by I.G.G.U.

Prof. D. R. BATES, Queens University, Belfast, Ireland ⁽¹⁾.

Dr. H. FRIEDMAN, Code 7320, U. S. Naval Research Laboratory, Washington 25, D. C., U. S. A. ⁽¹⁾.

Dr. M. NICOLET, Institut Royal Météorologique, 3, avenue Circulaire, Bruxelles 18, Belgium ⁽¹⁾.

Consultant : Sir Edward V. APPLETON.

I.U.C.A.F.

CHARACTERISTICS OF RADIO ASTRONOMICAL OBSERVATORIES

The Inter-Union Committee on Frequency Allocations for Radio Astronomy and Space Research has been collecting detailed characteristics of radio-astronomical observatories in various countries. Details of such observatories in the United States of America have already been published in *Information Bulletin No. 134* (p. 43); but more comprehensive information has been collected by the International Telecommunication Union (I.T.U.) and published in their Circulars numbers :

788, 797, 807, 812, 815, 817, 820, 822

Copies of these circulars in the English, French or Spanish language can be obtained from :

Dr. R. L. SMITH-ROSE,
Secretary-General, I.U.C.A.F.
21, Tumblewood Road,
Banstead, Surrey,
England.

⁽¹⁾ Subject to approval by I.U.G.G.

I. C. S. U.

I. C. S. U. Review of World Science

I.C.S.U. Review has changed its name : it is now the *I.C.S.U. Review of World Science*, n° 1 of volume 5 (January 1963) contains the following papers :

Editorial.

The Royal Netherlands Academy of Science and Letters,
P. J. FORBES.

International Organisations in Oceanography, G. BÖHNECKE.
The Relation between Geology and Geophysics, L. V. DE SITTER.
Cosmology and the I.A.U.

The International Astronomical Union, Otto STRUSE.

Viktor Amazospovich Ambartsumian : A Portrait, A. MASSEVITCH.

Optical Observational Aspects of Cosmology, N. V. MAYALL.

Cosmology, Mach's Principle and Relativity, R. H. DICK.

Radio Astronomy Observation relevant to Cosmology, J. S. HEY.

New Scale of Nuclidic Masses and Atomic Weights, E. WICKERS.

A Twentieth Century Drug Garden, J. M. FOGG, Jr.

Notes on Contributors.

Structure of I.C.S.U. Secretariat

(Reprint from the *Information Bulletin*, n° 4, January 1963)

Several National Members have asked how the I.C.S.U. Secretariat is constituted and the composition of its staff. Its structure is therefore indicated below. As the Secretariat has been asked repeatedly to assure a service of translation of documents (in parti-

cular for I.B.P.), and to centralize some publications, a department of publications and translation is being created now, and some modifications are being made to the Secretariat Headquarters in Rome, in order to provide for this department a fairly large room, which could also be used for meetings of up to 12 persons. Experience has shown indeed that I.C.S.U. bodies liked to meet in the Secretariat Headquarters where they feel at home and can be provided with secretarial and other facilities.

| | Present Holder | Nationality |
|--|-----------------------------|-------------|
| The I.C.S.U. Secretariat is placed under the authority of I.C.S.U. Secretary General, who is represented in the Secretariat by his Executive Secretary | Prof. Dr. J. VAN MIEGHEM | Belgian |
| | A. E. DECAE | French |
| 1. Department of General Affairs, in charge of the Executive Secretary | | |
| 2. Department of the Biological Programme in charge of a Scientific Secretary | F. W. G. BAKER | British |
| 3. Department of F.A.G.S., in charge of a Scientific Secretary ⁽¹⁾ | A. MOORE | British |
| 4. Department of I.Q.S.Y., in charge of a Scientific Secretary ⁽²⁾ | C. M. MINNIS | British |
| 5. Department of Finances, in charge of an Administrative Secretary (this Department receives also directions from I.C.S.U. Treasurer) | A. S. MACLENNAN | British |
| 6. Department of Translations and Publications, in charge of an Assistant Scientific Secretary | Mrs J. BAKER | French |
| 7. Department of typing, filing, mail and telephone for all offices, in charge of a Secretary | Miss A. LA COMBE | French |
| 8. Assisted by two typists : a typist more particularly in charge of financial mail and documents | Miss D. SPENCER | British |
| a typist more particularly in charge of mail handling and telephone | Miss A. BROGNA | Italian |

⁽¹⁾ This Department is at present in Paris.

⁽²⁾ This Department is at present in London.

UNESCO

Programme et Budget approuvés pour 1963-1964

(See *English Text*, p. 96)

Ce programme et ce budget ont été publiés sous forme d'un volume de 500 pages dont nous avons extrait les principales résolutions intéressant directement le Département des Sciences Exactes et Naturelles, ainsi que quelques développements pouvant avoir une répercussion sur les activités de l'U.R.S.I.

2.1. — Développement de la coopération scientifique internationale

2.11. — COOPÉRATION AVEC LES ORGANISATIONS SCIENTIFIQUES NON GOUVERNEMENTALES.

Résolution 2.111. — Les Etats membres sont invités à encourager la création et le développement d'associations nationales spécialisées dans les diverses branches des sciences exactes et naturelles, et à aider ces associations à s'affilier aux organisations scientifiques internationales non gouvernementales existantes et à coopérer activement avec elles.

Résolution 2.112. — Le Directeur Général est autorisé à collaborer avec les organisations scientifiques internationales non gouvernementales, à faciliter la coordination de leurs activités respectives, à leur accorder des subventions jusqu'à concurrence d'une somme totale de 480.000 dollars et à leur fournir des services appropriés, en vue de développer l'action de l'U.N.E.S.C.O. dans le domaine des sciences exactes et naturelles.

Remarque. — Les organisations scientifiques internationales non gouvernementales avec lesquelles l'U.N.E.S.C.O. a une collaboration régulière sont :

— le Conseil International des Unions Scientifiques (I.C.S.U.);

- la Fédération des Services Astronomiques et Géophysiques (F.A.G.S.);
- le Conseil des Organisations Internationales des Sciences Médicales (C.I.O.M.S.);
- l'Union des Associations Techniques Internationales (U.A.T.I.);
- l'Union Internationale pour la Conservation de la nature et de ses ressources.

2.12. — COOPÉRATION INTERNATIONALE POUR L'AVANCEMENT DE LA RECHERCHE SCIENTIFIQUE.

Résolution 2.121. — Le Directeur Général est autorisé, avec le concours du Comité consultatif international de la recherche dans le programme des sciences exactes et naturelles de l'U.N.E.S.C.O. et en collaboration avec les organisations compétentes du système des Nations Unies et les organisations scientifiques appropriées, à développer la coopération internationale pour l'avancement de la recherche scientifique notamment dans les domaines des sciences biologiques et de la chimie, et à cette fin :

- a) à stimuler la collaboration interdisciplinaire dans les recherches sur le cerveau en soutenant les activités de l'Organisation internationale de recherche sur le cerveau, notamment celles qui concernent l'organisation de cours de formation, de colloques et de stages d'études portant sur des questions interdisciplinaires relatives aux recherches sur le cerveau ;
- b) à encourager la coopération interdisciplinaire dans les recherches de biologie cellulaire en facilitant la création d'une organisation internationale de la recherche cellulaire, l'établissement d'un réseau de laboratoires associés, ainsi que l'organisation de cours de formation, de colloques et de stages d'études portant sur des questions interdisciplinaires relatives à la recherche cellulaire ;
- c) à promouvoir, au double échelon national et régional, la recherche scientifique dans le domaine de la chimie.

Projet 2.121.1. — *Comité consultatif international de la recherche dans le programme des sciences exactes et naturelles.*

Pour répondre aux besoins actuels de la communauté scientifique internationale, le Comité consultatif international de la recherche dans le programme des sciences exactes et naturelles de

l'U.N.E.S.C.O. sera reconstitué et ses attributions seront élargies. Outre qu'il aidera le Directeur Général, par ses conseils, à élaborer ses programmes d'action ultérieure, ce Comité permettra aux hommes de qui dépend la politique des gouvernements en matière scientifique d'étudier les besoins et les mesures qu'il est possible de prendre dans le domaine de la coopération scientifique internationale.

A cette fin, le Comité comprendra trois catégories de membres : (i) hommes de science appelés à fixer la politique scientifique des gouvernements (représentants de ministères scientifiques ou chargés de la recherche scientifique, directeurs d'organismes patronaux de recherche, présidents d'académies des sciences, conseillers scientifiques auprès de l'Organisation des Nations Unies, des Institutions spécialisées et des organisations intergouvernementales); (ii) présidents ou secrétaires d'unions scientifiques internationales; (iii) hommes de science éminents, désignés par cooptation, suivant les besoins, pour étudier certains problèmes. Ce Comité se réunira une fois tous les deux ans et tiendra sa neuvième session au début de 1963.

2.13. — COORDINATION DE LA DOCUMENTATION ET DE L'INFORMATION SCIENTIFIQUES.

Résolution 2.131. — Les Etats membres sont invités :

- a) à créer et à développer des services nationaux ou régionaux de documentation scientifique et technique et à coordonner leurs activités avec d'autres centres analogues, particulièrement dans la région à laquelle ils appartiennent ;
- b) à s'efforcer de constituer des bibliographies scientifiques et de normaliser la terminologie dans leurs langues nationales ;
- c) à participer, chaque fois qu'il y a lieu, aux travaux de coordination entrepris par l'U.N.E.S.C.O. dans les différents domaines de la documentation relative aux sciences exactes et naturelles.

Résolution 2.132. — Le Directeur Général est autorisé, avec l'aide du Comité consultatif international de bibliographie, de documentation et de terminologie :

- a) à organiser des réunions de représentants des organisations compétentes du système des Nations Unies, des unions scienti-

fiques, des organismes professionnels, des services gouvernementaux et non gouvernementaux de documentation, et des rédacteurs de publications scientifiques, primaires ou analytiques, en vue d'étudier les moyens d'améliorer, par la recherche et, au besoin, par l'établissement d'un nouveau dispositif approprié de coordination internationale ou régionale, l'état actuel de la documentation scientifique ;

- b) à encourager les organismes gouvernementaux et non gouvernementaux, les unions scientifiques et les organisations professionnelles à entreprendre une action concertée pour coordonner, sur le plan national, leurs travaux de documentation scientifique, et
- c) à conseiller et à aider les Etats membres, ainsi que les organisations nationales compétentes, dans la création ou l'amélioration de services de documentation scientifique et technique, et le développement de la recherche en matière de documentation des sciences exactes et naturelles.

Résolution 2.133. — Le Directeur Général est autorisé à continuer d'assurer, par la publication de la revue trimestrielle « Impact - Science et Société », la diffusion d'informations et d'études concernant l'influence des progrès scientifiques sur le bien-être de l'humanité.

Projet 2.132.1. — *Amélioration des services de documentation scientifique.*

Avec le concours du Comité consultatif international de bibliographie, de documentation et de terminologie, qui tiendra sa deuxième session au début de 1963, le Secrétariat réunira, en 1963, des groupes de travail composés de représentants des organisations intéressées du système des Nations Unies, des unions scientifiques internationales, des services gouvernementaux et non gouvernementaux de documentation, des organismes professionnels et des rédacteurs de périodiques scientifiques, primaires ou analytiques.

Les groupes de travail étudieront les moyens d'améliorer, au besoin par des recherches, l'état actuel de l'information et de la documentation scientifiques, notamment en ce qui concerne :

- (i) les publications scientifiques primaires ;
- (ii) les périodiques et les services d'analyse et d'indexage ;

- (iii) les traductions et la terminologie scientifiques ;
- (iv) la mécanisation et le codage de la documentation scientifique ;
- (v) la documentation concernant les congrès et les réunions scientifiques.

Au début de 1964, un dernier groupe de travail technique se réunira pour définir, sur la base des recommandations des groupes de travail, les mesures précises à proposer aux organisations du système des Nations Unies, aux gouvernements, aux unions scientifiques et aux organisations professionnelles, notamment l'adaptation et l'amélioration des moyens existants et, au besoin, la création de nouveaux dispositifs internationaux pour la coordination des différents travaux de documentation scientifique. Ce groupe de travail technique pourrait suggérer, par exemple, les mesures suivantes :

- (i) Application des recommandations formulées dans l'Etude sur les services d'analyse scientifique dans le monde, élaborée par l'U.N.E.S.C.O. à l'intention du Conseil économique et social ;
- (ii) Création de centres régionaux chargés de recueillir et de diffuser les traductions existantes d'ouvrages scientifiques dans les langues de leurs régions respectives, ainsi que de coordonner les travaux d'analyse et les recherches sur les problèmes relatifs à l'emmagasinage et au dépistage des informations ;
- (iii) Mesures propres à encourager les rédacteurs de périodiques scientifiques et techniques à s'associer par pays, par région, par discipline ou par langue, de manière à préparer la création d'une fédération internationale des rédacteurs de périodiques scientifiques et techniques ;
- (iv) Mesures nouvelles visant à améliorer les actes des congrès et des réunions scientifiques, et à les rendre plus facilement accessibles.

Le groupe de travail pourrait aussi recommander que soient effectuées des études sur certaines questions, par exemple : valeur relative des index et des analyses pour les usagers ; moyens de publier des documents scientifiques ailleurs que dans des périodiques ; comparaison entre différentes méthodes d'indexage mécanique et entre différentes méthodes de recherche rétrospective de documents scientifiques (99.000 dollars).

Certaines des recommandations du groupe de travail technique pourront être mises en application en 1964 ; les autres, par exemple celles qui concernent la création de nouveaux dispositifs internationaux, seront, après études par le Comité consultatif international de bibliographie, de documentation et de terminologie, soumises à la Conférence générale à sa treizième session, en 1964 (10.000 dollars).

2.2. — Coordination de la Recherche dans le domaine des Sciences de la Terre et des Ressources naturelles sur le plan international et régional

Résolution 2.201. — Les Etats membres sont invités :

- a) à encourager les recherches et les études scientifiques dans le domaine des sciences de la terre et des ressources naturelles et à promouvoir sur le plan national des mesures pour la conservation et l'utilisation rationnelles de ces ressources ;
- b) à coopérer avec d'autres Etats membres, avec l'U.N.E.S.C.O. et avec les organisations scientifiques internationales compétentes à des activités relatives aux sciences de la terre et aux recherches sur les ressources naturelles, notamment chaque fois que la collaboration internationale est une condition essentielle du progrès.

2.21. — ETUDES SCIENTIFIQUES RELATIVES AUX RESSOURCES NATURELLES.

Résolution 2.211. — Le Directeur général est autorisé, en collaboration avec les institutions compétentes du système des Nations Unies et avec les organisations scientifiques de caractère national, régional ou international intéressées à la question et avec le concours de comités consultatifs ou de groupes d'experts appropriés, à encourager, dans le domaine des sciences de la terre, les études, les recherches et la formation portant sur les ressources naturelles et leur conservation, notamment :

- a) en assurant la normalisation et l'étalonnage des méthodes modernes de recherche et d'exploration des ressources naturelles, y compris la convocation d'une conférence interdisciplinaire sur les méthodes d'exploration de la terre ;

- b) en procédant à la synthèse des connaissances scientifiques concernant les ressources naturelles, y compris l'octroi d'une assistance en vue de l'établissement de cartes scientifiques internationales ;
- c) en mettant au point un programme concerté d'études, d'échanges d'information et de formation de personnel dans le domaine de la biologie des sols ;
- d) en appliquant, conformément au plan arrêté par la Conférence générale lors de sa onzième session, et avec le concours du Comité consultatif de recherches sur la zone aride, un programme mondial d'études et de formation de personnel portant sur les problèmes scientifiques des zones arides, et tout particulièrement sur ceux qui se posent en Amérique latine ⁽¹⁾ ;
- e) en développant le programme actuel d'études et de formation de personnel portant sur les problèmes scientifiques de la zone tropicale humide, avec le concours du Comité consultatif de recherches sur la zone tropicale humide ;
- f) en convoquant une conférence internationale sur l'organisation de la recherche et de la formation du personnel en Afrique, en ce qui concerne l'étude, la conservation et l'utilisation des ressources naturelles ⁽²⁾.

⁽¹⁾ La Conférence générale a adopté la liste ci-après des pays appelés à participer à la Conférence scientifique régionale sur les terres arides d'Amérique latine : Argentine, Bolivie, Brésil, Chili, Colombie, Costa Rica, République Dominicaine, Equateur, Guatemala, Haïti, Honduras, Jamaïque, Mexique, Nicaragua, Panama, Paraguay, Pérou, Salvador, Trinité et Tobago, Uruguay et Venezuela.

⁽²⁾ La Conférence générale a adopté la liste ci-après des pays appelés à participer à la Conférence sur la recherche scientifique et la formation de personnel touchant les ressources naturelles de l'Afrique : Algérie, Basutoland, Bechuanaland, Burundi, Cameroun, République centrafricaine, Congo (Brazzaville), Congo (Léopoldville), Côte-d'Ivoire, Dahomey, Ethiopie, Gabon, Gambie, Ghana, Guinée, Haute-Volta, Kenya, Libéria, Libye, Madagascar, Mali, Maroc, Ile Maurice, Mauritanie, Niger, Nigeria, Nyassaland, Ouganda, République arabe unie, Fédération de Rhodésie et du Nyassaland, Rhodésie du nord, Rhodésie du sud, Rwanda, Sénégal, Sierra Leone, Somalie, Soudan, Swaziland, Tanganyika, Tchad, Togo, Tunisie, Zanzibar.

2.22. — GEOPHYSIQUE ET SCIENCES DE L'ESPACE.

Résolution 2.221. — Le Directeur général est autorisé — en collaboration avec le Comité des utilisations pacifiques de l'espace extra-atmosphérique (Nations Unies), avec les organisations compétentes du système des Nations Unies, y compris l'Organisation météorologique mondiale et l'Union internationale des télécommunications, et avec les organisations scientifiques internationales non gouvernementales appropriées, notamment le Comité des recherches spatiales et le Comité international de géophysique du Conseil international des unions scientifiques, l'Union géodésique et géophysique internationale et l'Union radio-scientifique internationale — à faciliter et à promouvoir la collaboration internationale pour l'étude scientifique de la terre et de l'espace terrestre, et en particulier :

- a) en matière de séismologie, à organiser des missions d'enquête et à convoquer une réunion intergouvernementale chargée de définir et de décider l'action concertée à entreprendre pour améliorer les réseaux de stations séismologiques et les dispositifs d'alarme, afin de mieux connaître les causes des tremblements de terre et de pouvoir leur opposer une protection plus efficace ;
- b) à aider la Fédération des services astronomiques et géophysiques et les autres organismes scientifiques compétents à améliorer le rassemblement, l'analyse et l'échange des données astronomiques et géophysiques ;
- c) à favoriser le développement des connaissances scientifiques concernant la terre et l'espace terrestre dans le cadre du programme des Nations Unies pour les utilisations pacifiques de l'espace extra-atmosphérique, et pour cela :
 - (i) à faciliter les échanges d'informations sur les divers aspects de la géophysique et des sciences de l'espace ;
 - (ii) à coopérer avec les organisations internationales non gouvernementales compétentes à l'élaboration de programmes internationaux de recherche concernant la géophysique et les sciences de l'espace ;

(iii) à aider à la création ou à la modernisation, dans le monde entier, d'observatoires géophysiques et astronomiques, capables d'assurer la formation poussée de spécialistes, la fourniture d'équipement spécialisé et les services d'experts pour orienter la recherche.

Projet 2.221.4. — Rassemblement, analyse et diffusion de données astronomiques et géophysiques.

La Fédération des services astronomiques et géophysiques (F.A.G.S.) groupe 13 services chargés de rassembler, d'analyser et de publier les données recueillies par plus de 1000 observatoires répartis dans toutes les régions du monde. Ces données servent de base aux recherches menées par les astronomes et les géophysiciens de nombreux pays. Au moyen d'une subvention annuelle, l'U.N.E.S.C.O. aide la Fédération à faire face aux dépenses de fonctionnement des services en question.

Le volume des données rassemblées par les services de la F.A.G.S. a beaucoup augmenté ces dernières années, ce qui a conduit à utiliser des calculatrices électroniques dans plusieurs de ces services. Par suite de l'emploi de ces machines, il a fallu apporter à la structure de la Fédération quelques modifications qui devront être complétées par d'autres.

En 1963-1964, les possibilités de fusion des deux services chargés du traitement des données séismologiques (le Bureau central international de séismologie de Strasbourg et l'« International Seismological Summary » de Kew) feront l'objet d'une étude attentive. Une aide sera accordée à la F.A.G.S. et à l'Association internationale de séismologie pour l'étude de ce problème qui sera également examiné à la réunion intergouvernementale dont il a été question plus haut au paragraphe 2147.

Le « Levé magnétique mondial » (1960-65), l'« Année internationale de l'activité solaire minimale » (1964-1965) et les études de la terre au moyen de satellites artificiels imposeront dans les quelques années à venir un travail accru à tous les services de la F.A.G.S. et notamment à ceux qui s'intéressent à la géodésie, à la gravimétrie, au géomagnétisme et à l'ionosphère. Une aide sera apportée à la F.A.G.S. et aux unions scientifiques internationales compétentes pour les travaux de planification et d'orga-

nisation à entreprendre afin de répondre aux exigences nouvelles en ce qui concerne la réduction et l'analyse des données géophysiques.

Projet 2.221.5. — Sciences de l'Espace.

Pour ce qui est de l'étude et de l'exploration de la terre et de l'espace avoisinant, une coopération internationale s'imposera dans tous les cas où la réalisation d'une expérience donnant lieu à l'emploi d'un satellite artificiel ou d'un engin de sondage cosmique nécessitera des observations soigneusement coordonnées, effectuées à partir de points largement disséminés à la surface du globe. Elle sera, en particulier, nécessaire pour toutes les études géophysiques ou géodésiques menées à l'aide de satellites. L'action de l'U.N.E.S.C.O. visera essentiellement, dans ce domaine, à encourager les pays peu développés dont la situation géographique est particulièrement favorable à prendre une part active à ces travaux.

Afin de favoriser les échanges internationaux d'informations et d'idées en matière de géophysique et de sciences de l'espace, ainsi que d'encourager la coopération entre les hommes de science du monde entier pour l'analyse des résultats de la recherche et l'établissement de nouveaux programmes de recherche, une assistance sera apportée au C.O.S.P.A.R., aux unions scientifiques intéressées (U.A.I., U.R.S.I., U.G.G.I., etc.) et à la Fédération astronautique internationale, pour couvrir le coût des colloques, groupes d'études et autres réunions scientifiques au cours desquelles seront évalués, synthétisés et confrontés les résultats de la recherche. Un cours régional de formation, portant sur un secteur particulier de la géophysique sera organisé par l'un des Postes de coopération scientifique de l'U.N.E.S.C.O.

En réponse à la demande d'informations techniques touchant les divers aspects de la recherche et de l'exploration spatiales, une aide sera apportée au C.O.S.P.A.R. pour l'élaboration et la publication d'une série de manuels sur les conditions techniques qu'exige le repérage optique ou radioélectrique de la marche des satellites artificiels, la réception télémétrique, le lancement des fusées d'exploration (choix et aménagement des sites), etc.

Une aide sera également apportée aux organisations scientifiques non gouvernementales compétentes pour l'élaboration de

programmes internationaux de recherche, notamment celui de l'Année internationale de l'activité solaire minimale.

En coopération avec l'O.M.M., le C.I.U.S. et l'U.G.G.I., on entreprendra des études - pilotes sur l'apport des données photographiques et autres obtenues à partir de satellites à la connaissance de l'atmosphère terrestre et de l'hydrosphère. Les problèmes théoriques et pratiques de biologie extraterrestre seront également examinés de concert avec le C.O.S.P.A.R., la Fédération astronautique internationale et les unions scientifiques compétentes. On encouragera également la coopération internationale pour l'étude des données fournies par les satellites météorologiques.

En 1963-1964, dans le cadre du programme des Nations Unies sur les utilisations pacifiques de l'espace extra-atmosphérique, l'U.N.E.S.C.O. fournira une aide aux Etats membres pour la création et/ou la modernisation d'observatoires astronomiques et géophysiques convenablement situés, notamment dans les régions géographiques présentant un intérêt particulier du point de vue scientifique, comme les régions équatoriales. Cette aide se traduira par l'envoi de missions d'experts de courte durée, par l'octroi de bourses et, dans certains cas, par la fourniture d'instruments et de matériel spéciaux. Cela permettra peut-être à ces observatoires d'apporter une contribution utile à l'étude du champ magnétique terrestre, de l'ionosphère, de la physique et de la chimie de la haute atmosphère, etc. Des bourses seront accordées à des hommes de science de pays peu développés pour leur permettre de participer aux stages de formation qui se tiendront dans les centres actuels de recherche les plus appropriés. Une liaison étroite sera maintenue à cet effet avec le Comité International de géophysique (C.I.G.), le C.O.S.P.A.R., le Comité de l'Année internationale de l'activité solaire minimale et les unions scientifiques intéressées.

Dans l'élaboration et l'exécution de ce programme, l'U.N.E.S.C.O. coopérera étroitement avec le Comité des Nations Unies sur les utilisations pacifiques de l'espace extra-atmosphérique.

Projet 2.221.6. — Bourses au titre des sciences de l'espace.

Des bourses seront mises à la disposition des Etats membres pour la création et la modernisation d'observatoires d'astronomie et de géophysique.

2.3. — Aide au développement scientifique et technique sur le plan national

2.31. — INFORMATIONS SUR LA POLITIQUE SCIENTIFIQUE DES ÉTATS MEMBRES.

Résolution 2.311. — Les Etats membres sont invités à mettre en œuvre une politique scientifique nationale et à assurer une interaction harmonieuse et mutuellement profitable entre l'encouragement de la recherche scientifique et le progrès économique et social.

Résolution 2.312. — Le Directeur général est autorisé, en collaboration avec les organisations internationales compétentes et les Etats membres intéressés :

- a) à assurer le rassemblement, l'analyse et la diffusion d'informations concernant l'organisation et le financement de la recherche scientifique dans les Etats membres ;
- b) à effectuer des enquêtes et des études sur la politique scientifique nationale des Etats membres ;
- c) à organiser des réunions d'experts chargés de formuler des recommandations sur les objectifs et les méthodes de la programmation prospective en matière de politique scientifique nationale ;
- d) à aider les Etats membres qui en feront la demande à améliorer et à développer leurs politiques et leurs institutions scientifiques nationales.

2.32. — AIDE A LA RECHERCHE TECHNOLOGIQUE.

Résolution 2.321. — Le Directeur général est autorisé à aider les Etats membres à améliorer les institutions de recherches technologiques qu'ils possèdent ou à en créer de nouvelles.

Résolution 2.322. — Le Directeur général est autorisé, en collaboration avec les organisations compétentes, nationales et internationales, gouvernementales et non gouvernementales, à encourager les recherches technologiques, notamment :

- a) en recueillant des renseignements sur les instituts de recherches technologiques et les laboratoires d'essais en vue d'aider à établir les plans d'établissements analogues dans les pays en voie de développement ;

- b) en finançant ou en organisant des stages d'études, internationaux et régionaux, afin de contribuer à la diffusion de nouvelles techniques de recherches technologiques ;
- c) en aidant les Etats membres à développer leurs recherches technologiques.

2.33. — DÉVELOPPEMENT DE L'ENSEIGNEMENT SCIENTIFIQUE ET TECHNIQUE AU NIVEAU UNIVERSITAIRE.

Résolution 2.331. — Le Directeur général est autorisé à aider les Etats membres à améliorer les institutions d'enseignement supérieur scientifique et technique existantes ou à en créer de nouvelles.

Résolution 2.332. — Le Directeur général est autorisé à collaborer avec les organisations compétentes — nationales et internationales, gouvernementales et non gouvernementales — en vue de promouvoir l'enseignement des sciences au niveau universitaire et, en particulier, d'accélérer et d'améliorer la formation de savants et d'ingénieurs dans les pays en voie de développement, par les moyens suivants :

- a) en effectuant des études comparatives sur différents systèmes de formation des savants et des ingénieurs, notamment sur les programmes, le matériel de laboratoire, les méthodes pédagogiques et l'organisation des facultés ;
- b) en encourageant la production et l'utilisation de nouveaux manuels de sciences fondamentales et d'autres auxiliaires pédagogiques, ainsi que leur adaptation à l'enseignement universitaire ;
- c) en exécutant dans des universités appropriées des projets-pilotes pour mettre à l'essai de nouvelles méthodes et techniques d'enseignement des sciences ;
- d) en subventionnant des cours et stages d'études internationaux et régionaux pour étudiants gradués, organisés par des Etats membres dans diverses branches de la science et de la technique ;
- e) en organisant des conférences internationales et régionales sur l'enseignement des sciences fondamentales, ou en participant à leur organisation ;
- f) en patronnant des tournées de conférences faites par des savants de réputation internationale dans certaines universités ;

- g) en décernant le prix Kalinga pour des travaux exceptionnels de vulgarisation scientifique.

2.4. — Postes de Coopération Scientifique

Résolution 2.411. — Le Directeur général est autorisé :

- a) à continuer d'assurer le fonctionnement des Postes de coopération scientifique ci-après :
- (i) Poste de Montevideo (pour l'Amérique latine),
 - (ii) Poste du Caire (pour le Moyen-Orient),
 - (iii) Poste de la Nouvelle-Delhli (pour l'Asie du sud),
 - (iv) Poste de Djakarta (pour l'Asie du sud-est) ;
- b) à créer un poste d'administrateur chargé des questions de coopération scientifique pour l'Afrique. Les Postes et l'administrateur susmentionnés aideront, dans leurs régions respectives, à l'exécution du programme de sciences exactes et naturelles exposé plus haut, et des projets relevant du Programme d'assistance technique et du Fonds spécial.

UNESCO

Approved Programme and Budget for 1963-1964

Such programme and budget have been issued in the form of a book of nearly 500 pages of which we have taken out the main resolutions connected with the Department of Natural Sciences and also some developments which might have an effect on U.R.S.I. activities.

2.1. — Promotion of international scientific co-operation

2.11. — CO-OPERATION WITH INTERNATIONAL NON-GOVERNMENTAL SCIENTIFIC ORGANIZATIONS.

Resolution 2.111. — Member States are invited to encourage the creation and development of national associations specialized

in the various fields of the natural sciences, and to facilitate their affiliation and active-co-operation with existing international non-governmental scientific organizations.

Resolution 2.112. — The Director-General is authorized to collaborate with international non-governmental scientific organizations, to foster the coordination of their respective activities and to provide them with subventions to a total amount not exceeding \$ 480.000, and services as appropriate, for the promotion of the work of U.N.E.S.C.O. in the fields of the natural sciences.

Note. — International non-governmental scientific organizations co-operating with U.N.E.S.C.O. are :

- the International Council of Scientific Unions (I.C.S.U.);
- the Federation of Astronomical and Geophysical Services (F.A.G.S.);
- the Council for International Organizations of Medical Sciences (C.I.O.M.S.);
- the Union of International Engineering Organizations (U.A.T.I.);
- the International Union for Conservation of Nature and Natural Resources (I.U.C.N.).

2.12. — INTERNATIONAL CO-OPERATION FOR THE ADVANCEMENT OF SCIENTIFIC RESEARCH.

Resolution 2.121. — The Director-General is authorized, with the assistance of the International Advisory Committee on Research in the Natural Sciences programme of U.N.E.S.C.O. and in co-operation with the competent Organizations of the United Nations system and appropriate scientific bodies, to develop international co-operation for the advancement of scientific research, particularly in the fields of the life sciences and chemistry, and to this end :

- (a) To stimulate interdisciplinary collaboration in brain research by supporting the activities of the International Brain Research Organization including the organization of training courses, symposia and seminars in interdisciplinary subjects in the field of brain research ;

- (b) To promote interdisciplinary co-operation in cell biology research by assisting in the establishment of an International Cell Research Organization, in the organization of a network of associated laboratories, and in the organization of training courses, symposia and seminars in interdisciplinary subjects in the field of cell research, and
- (c) To promote scientific research in chemistry at the regional and national levels.

Project 2.121.1. — International Advisory Committee on Research.

In order to meet the present needs of the international scientific community, the International Advisory Committee on Research in the Natural Sciences programme of U.N.E.S.C.O. will be re-constituted with enlarged competence. In addition to advising the Director-General in the formulation of future programmes, it will provide a meeting ground for governmental science policy leaders to discuss the needs and possible action in international scientific co-operation.

To this end the Committee will be composed of three groups of members : (2014) (i) scientists belonging to the group of makers of governmental policy in science, such as the representatives of ministries of science or scientific research, heads of national research organizations or academies of science, and scientific advisers to the United Nations and to the Specialized Agencies and intergovernmental organizations ; (ii) presidents or secretaries of international scientific unions ; and (iii) eminent scientists coopted, as needed, to discuss specific problems. The Committee will meet once every two years, and its ninth session will be held early in 1963.

2.13. — CO-ORDINATION OF SCIENTIFIC DOCUMENTATION AND INFORMATION.

Resolution 2.131. — Member States are invited :

- (a) To establish and develop national or regional scientific and technical documentation services and to coordinate their activities with similar centres, especially in their own geographical area ;

- (b) To work on the preparation of scientific bibliographies and the standardization of terminology in their national languages ; and
- (c) To participate, whenever appropriate, in the coordination work undertaken by U.N.E.S.C.O. in the different fields of documentation relating to the Natural Sciences.

Resolution 2.132. — The Director-General is authorized, with the assistance of the International Advisory Committee on Bibliography, Documentation and Terminology :

- (a) To convene meetings of representatives of the competent organizations of the United Nations system, scientific unions, professional bodies, governmental and non-governmental documentation services, and editors of scientific primary and abstracting publications, to consider ways and means, including research and the establishment, if required, of appropriate new international or regional coordinating machinery, of improving the present situation in the field of scientific documentation ;
- (b) To encourage governmental and non-governmental bodies, scientific unions and professional organizations to take common action in coordinating, at the national level, their activities in the field of scientific documentation ; and
- (c) To advise and assist Member States and competent national organizations in establishing and/or improving scientific and technical documentation services and in developing research in the field of documentation in the Natural Sciences.

Resolution 2.133. — The Director General is authorized to continue the publication of the quarterly review *Impact of Science on Society* as a medium for the dissemination of information and studies on the influence of scientific developments on the well-being of mankind.

Project 2.132.1. — *Improvement of scientific documentation services.*

With the aid of the International Advisory Committee on Bibliography, Documentation and Terminology, which will hold its 2nd session early in 1963, working parties composed of representatives of interested organizations of the United Nations

system, international scientific unions, governmental and non-governmental documentation services, professional bodies and editors of scientific primary and abstracting periodicals, will be convened in 1963.

The working parties will survey ways and means, including research when required, of improving the present situation in scientific information and documentation, particularly in connexion with :

- (i) primary scientific publications ;
- (ii) abstracting and indexing periodicals and services ;
- (iii) scientific translations and terminology ;
- (iv) mechanization and coding in scientific documentation ;
and
- (v) information on congresses and scientific meetings.

On the basis of the recommendations of the working parties, a final technical working group will be convened early in 1964 to define the specific action to be suggested to the organizations of the United Nations system, governments, scientific unions and professional organizations, including the adaptation and improving of existing means, and, if necessary, the establishment of new international mechanisms for the co-ordination of the different aspects of scientific documentation. In particular, the final technical working group may suggest such action as follows :

- (i) Application of the recommendations contained in the Survey of Scientific Abstracting Services in the World, prepared by U.N.E.S.C.O. for submission to the Economic and Social Council ;
- (ii) Establishment of regional centres for collecting and circulating existing translations of scientific works in the languages of the regions concerned or for co-ordinating abstracting activities, including the problems concerning machine storage and retrieval of information ;
- (iii) Measures encouraging the association of editors of scientific and technical periodicals by countries, regions, disciplines or languages, as a preliminary phase in the eventual creation of an international federation of editors of scientific and technical periodicals ;

- (iv) Further action for improving the proceedings of congresses and scientific meetings and their availability.

It may also recommend to undertake studies such as : the relative value of indexes and abstracts to the users ; ways of publishing scientific papers other than through periodicals ; comparison between different systems of mechanical indexing and between different systems of retrospective research of scientific information.

Some of the recommendations of the final technical working group may be implemented during 1964, whilst others, e. g. these concerning the creation of new international mechanisms, will be submitted, after having been examined by the Bureau of the International Advisory Committee on Bibliography, Documentation and Terminology, for approval to the thirteenth session of the General Conference in 1964.

2.2. — Co-ordination of research in the Earth sciences and natural resources at the international and regional levels

Resolution 2.201. — Member States are invited :

- (a) To encourage scientific studies and research in the earth sciences and natural resources and to promote measures at the national level for the conservation and proper use of such resources ; and
(b) To co-operate with other Member States, U.N.E.S.C.O. and the appropriate international scientific organizations in activities relating to the earth sciences and natural resources research, particularly wherever international collaboration is a basic condition of progress.

2.21. — SCIENTIFIC STUDIES RELATING TO NATURAL RESOURCES.

Resolution 2.211. — The Director-General is authorized, in co-operation with the competent organizations of the United Nations system and the appropriate international, regional and national scientific bodies, and with the assistance of appropriate advisory Committees or groups of experts, to promote studies, research and training in the earth sciences relating to natural resources and their conservation, in particular :

- (a) By the standardization and intercalibration of modern methods of research and exploration of natural resources, including the convening of an interdisciplinary conference on methods of land exploration ;

- (b) By the synthesis of scientific knowledge relating to natural resources, including assistance in the preparation of international scientific maps ;
- (c) By developing a co-operative programme of studies, exchange of information and training in the fields of soil biology ;
- (d) By conducting, in accordance with the plan defined by the General Conference at its eleventh session, and with the assistance of the advisory Committee on Arid Zone Research, a world-wide programme of studies and training relating to the scientific problems of the arid zones with particular emphasis on problems arising in Latin America ⁽¹⁾ ;
- (e) By expanding the current programme of studies and training relating to the scientific problems of the humid tropics, with the assistance of the Advisory Committee on Humid Tropics Research ; and
- (f) By convening an international conference on the organization of research and training in Africa in relation to the study, conservation and utilization of natural resources ⁽²⁾.

2.22. — GEOPHYSICS AND SPACE SCIENCES.

Resolution 2.221. — The Director-General is authorized, in co-operation with the United Nations Committee on the Peaceful Uses of Outer Space, competent organizations of the United

⁽¹⁾ The General Conference adopted the following list of countries to participate in the Regional Scientific Conference on the Arid Regions of Latin America : Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela.

⁽²⁾ The General Conference adopted the following list of countries to participate in the Conference on Research and Training relating to Natural Resources in Africa proposed in the Work Plan : Algeria, Basutoland, Bechuanaland, Burundi, Cameroun, Central African Republic, Chad, Congo (Brazzaville), Congo (Léopoldville), Dahomey, Ethiopia, Gabon, Gambia, Ghana, Guinea, Ivory Coast, Kenya, Liberia, Libya, Madagascar, Mali, Mauritania, Mauritius, Morocco, Niger, Nigeria, Federation of Rhodesia and Nyasaland, Northern Rhodesia, Southern Rhodesia, Nyasaland, Rwanda, Senegal, Sierre Leone, Somalia, Sudan, Swaziland, Tanganyika, Togo, Tunisia, Uganda, United Arab Republic, Upper Volta, Zanzibar.

Nations system, especially the World Meteorological Organization and the International Telecommunications Union, and appropriate international non-governmental scientific organizations, especially the Committee on Space Research and the International Committee for Geophysics of the International Council of Scientific Unions, the International Union of Geodesy and Geophysics and the International Scientific Radio Union, to facilitate and promote international collaboration in the scientific study of the earth and of nearby space, and in particular :

- (a) To undertake survey missions and to call an intergovernmental meeting on seismology to define and agree on concerted action for the improvement of observatory networks and warning systems, leading to increased knowledge of the causes of earthquakes, and more effective protection against them ;
- (b) To assist the Federation of Astronomical and Geophysical Services and other competent scientific bodies in improving the collection, analysis and exchange of astronomical and geophysical data ; and
- (c) To further the scientific development of knowledge of the earth and nearby space, within the framework of the United Nations programme of peaceful uses of outer space, and to this end :
 - (i) to facilitate the exchange of information in various aspects of geophysics and space sciences ;
 - (ii) to co-operate with appropriate international non-governmental organizations in the planning of international research programmes in geophysics and space sciences ; and
 - (iii) to assist in the creation and/or modernization of suitable geophysical and astronomical observatories throughout the world for providing the advanced training of scientists, specialized equipment and experts to guide research.

Project 2.221.4. — Collection, analysis and exchange of astronomical and geophysical data.

The Federation of Astronomical and Geophysical Services (F.A.G.S.) groups together 13 Services which collect, analyse and publish data from over 1000 observatories in all parts of the world.

These data form the basis for astronomical and geophysical research by scientists in many countries. By means of an annual subvention U.N.E.S.C.O. assists the Federation to meet the running costs of these Services.

The volume of data handled by the Services had increased very considerably in recent years, and this had led to the employment of electronic computers by several of the Services. The use of such computers has and will entail some modification to the structure of the Federation.

In 1963-1964, careful consideration will be given to the possibility of merging into one the two services handling seismological data (the Bureau Central International de Séismologie in Strasbourg and the International Seismological Summary in Kew). Assistance will be given to F.A.G.S. and to the International Association of Seismology for studies of this problem, which will be examined at the Intergovernmental meeting referred to in para. 155 above.

The World Magnetic Survey 1960-1965, the International Quiet Sun Year, 1964-1965, and studies of the earth by means of artificial satellites, will place an increasing burden on all the services in the course of the next few years, particularly on those concerned with geodesy, gravimetry, geomagnetism and the ionosphere. Assistance will be given to F.A.G.S. and to the appropriate international scientific unions for planning and preparation to meet the new demands for the reduction and analysis of geophysical data.

Project 2.221.5. — Space sciences.

International co-operation in the study and exploration of the earth and nearby space will be essential whenever an experiment conducted by means of an artificial satellite or space probe requires supporting observations at points widely scattered over the earth's surface. This will occur particularly in geophysical and geodetic studies of the earth by means of satellites. U.N.E.S.C.O.'s action in this field will primarily aim at encouraging the less developed nations located in particularly advantageous positions to take an active part in these studies.

With a view to furthering the international exchange of information and ideas in geophysics and space sciences, and encouraging co-operation between scientists throughout the world in analysing

the results of research and in formulating new research programmes, assistance will be provided to C.O.S.P.A.R., the interested scientific unions (I.A.U., U.R.S.I., I.U.G.G., etc.) and to the International Astronautical Federation, to meet the costs of symposia, study groups and other scientific meetings at which the results of research will be evaluated, integrated and discussed. A regional training course in a selected branch of geophysics will be organized by a Field Science Co-operation Office.

For the purpose of meeting the demand for technical information on various aspects of space research and exploration, assistance will be provided to C.O.S.P.A.R. to prepare and publish a series of manuals on the technical requirements for optical and radio tracking of artificial satellites, telemetry reception, sounding rocket launching sites, etc.

Assistance will also be given to competent non-governmental scientific organizations in the planning of international research programmes, and in particular that of the International Year of the Quiet Sun. In co-operation with the W.M.O., I.C.S.U. and I.U.G.G., pilot studies of the use of photographic and other data from satellites in the study of the earth's atmosphere and hydrosphere will also be undertaken. In consultation with C.O.S.P.A.R., the International Astronautical Federation and appropriate scientific unions, the theoretical and practical problem of extra-terrestrial biology will be examined. Encouragement will be given to international co-operation in the study of data obtained from meteorological satellites.

In 1963-1964, within the framework of the United Nations programme of peaceful uses of outer space, U.N.E.S.C.O. will offer assistance to Member States in the establishment and/or modernization of suitably located astronomical and geophysical observatories, especially in geographical areas of particular scientific interest such as the equatorial regions of the earth, through short-term missions of experts, through fellowships and, in certain cases, by the supply of special instruments and equipment. These observatories may thus be able to make useful contributions to the study of the earth's magnetic field and ionosphere, of the physics and chemistry of the upper atmosphere, etc. Fellowships for scientists from less advanced countries will be provided to enable them to participate in training courses to be held at appropriate existing research centres.

Close consultation will be maintained in this connexion with the International Committee for Geophysics (C.I.G.), C.O.S.P.A.R., the I.Q.S.Y. Committee and the interested Scientific Unions (\$ 47.000).

In the planning and execution of this programme U.N.E.S.C.O. will work in close co-operation with the United Nations Committee on the Peaceful Uses of Outer Space.

Project 2.221.6. — Fellowships in space science.

Fellowships will be provided to Member States for the establishment and the modernization of astronomical and geophysical observatories.

2.3. — Aid to national scientific and technological development

2.31. — INFORMATION ON SCIENCE POLICY OF MEMBER STATES.

Resolution 2.311. — Member States are invited to develop a national science policy and to ensure that the interaction between the encouragement of scientific research on the one hand, and economic and social progress on the other, operates smoothly to the advantage of both.

Resolution 2.312. — The Director-General is authorized, in collaboration with appropriate international organizations and interested Member States :

- (a) To collect, analyse and disseminate information concerning the organization and financing of scientific research in Member States ;
- (b) To undertake surveys and studies on the national science policy of Member States ;
- (c) To organize meetings of experts to recommend objectives and methods of planning in national science policy ; and
- (d) To help Member States, upon request, in improving and developing their national scientific policy and institutions.

2.32. — AID TO TECHNOLOGICAL RESEARCH.

Resolution 2.321. — The Director-General is authorized to help Member States in improving existing institutions or establishing new institutions for technological research.

Resolution 2.322. — The Director-General is authorized, in collaboration with competent national and international, governmental and non-governmental organizations, to promote technological research, in particular :

- (a) by collecting information on technological research institutions and testing laboratories, with a view to helping in planning similar institutions in developing countries ;
- (b) by supporting or organizing international and regional seminars to help in the diffusion of new techniques in technological research ; and
- (c) by assisting Member States in the development of their technological research.

2.33. — AID TO SCIENTIFIC AND TECHNOLOGICAL TEACHING AT UNIVERSITY LEVEL.

Resolution 2.331. — The Director-General is authorized to help Member States in improving existing higher educational institutions for science and technology, or in establishing new institutions.

Resolution 2.332. — The Director-General is authorized to collaborate with competent national and international governmental and non-governmental organizations, to promote science teaching at the university level and, in particular, to accelerate and upgrade the training of scientists and engineers in developing countries.

- (a) By conducting comparative studies of different systems of education for the training of scientists and engineers, including curricula, laboratory equipment, teaching methods and organization of faculties ;
- (b) by promoting the production and utilization of new source books in the basic sciences and other teaching aids and their adaptation to university education ;

- (c) by establishing in appropriate universities, pilot projects for testing new methods and techniques in science teaching ;
- (d) by supporting international and regional post-graduate training courses and seminars established by Member States in selected branches of science and technology ;
- (e) by organizing, or collaborating in the organization of, international and regional conferences on basic science teaching ;
- (f) by sponsoring internationally known scientists as visiting lecturers at selected universities ; and
- (g) by awarding the Kalinga Prize for outstanding work accomplished in the popularization of science.

2.4. — Science Co-operation Offices

Resolution 2.411. — The Director-General is authorized :

- (a) to continue the operation of the following Science Co-operation Offices :
 - (i) in Montevideo for Latin America,
 - (ii) in Cairo for the Middle East,
 - (iii) in New Delhi for South Asia,
 - (iv) in Djakarta for South East Asia, and
- (b) to establish a post of Science Co-operation Officer for Africa.

The above Offices and the Science Co-operation Officer for Africa will assist in the execution of the Natural Sciences programme as set out above, including Technical Assistance and Special Fund projects, in their respective regions.

WORLD METEOROLOGICAL ORGANIZATION

Bibliography

The « Annalen der Meteorologie » has issued :

« The History of the International Meteorological Organization,
1872-1951 », by Hendrik Gerrit CANNEGRETER.

**FÉDÉRATION INTERNATIONALE
D'ASTRONAUTIQUE
ACADÉMIE INTERNATIONALE
D'ASTRONAUTIQUE**

Désignation d'un Secrétaire

Le Professeur Th. von Karman, Président de l'Académie Internationale d'Astronautique, annonce, à Paris, la désignation de M. William Frank Hilton comme Secrétaire de l'Académie. M. Hilton, docteur ès sciences anglais, ingénieur de l'Astronautique, assurera également les fonctions de Secrétaire exécutif de la Fédération Internationale d'Astronautique. Il occupe son poste à partir du 14 mars, au siège des deux organisations, 5, rue du 4 septembre, Paris 2^e.

COMMISSION ELECTROTECHNIQUE INTERNATIONALE (C. E. I.)

Publications

(See *English text*, p. 121)

Nous avons extrait du « Catalogue des Publications de la C.E.I. » mis à jour au 31 décembre 1962 les publications pouvant intéresser nos lecteurs.

Les publications marquées d'un astérisque (*) sont des publications en révision et dont il est prévu que la nouvelle édition paraîtra prochainement.

- 27 (1953) *Symboles littéraux internationaux utilisés en électricité (Symboles de grandeurs, alphabets et caractères).
15 p. 3.—Fr. s.
Contient une liste de symboles littéraux utilisés en électricité et précise comment ceux-ci peuvent être employés et combinés. Spécifie les alphabets et les caractères à utiliser.
- 50 : — Vocabulaire Electrotechnique International.
Glossaire de termes utilisés en électrotechnique suivis de leurs définitions en anglais et en français. Les termes équivalents seuls sont donnés en allemand, en espagnol, en italien, en néerlandais, en polonais et en suédois. Contient un index séparé pour chacune des huit langues. Le vocabulaire est publié sous forme de fascicules séparés, chaque fascicule traitant d'un domaine particulier.
- 50 (07) (1956) Electronique.
157 p. 12.— Fr. s.
- 50 (20) (1958) Appareils de mesure scientifiques et industriels.
88 p. 9.— Fr. s.
- 50 (62) (1961) Guides d'ondes.
46 p. 8.— Fr. s.
- 65 (1952) Règles de sécurité pour les récepteurs radiophoniques reliés à un réseau de distribution d'énergie.
49 p. 5.— Fr. s.

Modification 1 (1958)

11 p. 2.— Fr. s.

Cette spécification a été établie en plein accord par la C. E. I. et la C. E. E. (Commission Internationale de Réglementation en vue de l'Approbation de l'Équipement Électrique) et remplace la Publication de la C.E.E. traitant du même sujet éditée en juin 1948. Elle est identique à la Publication n° 1 de la C.E.E. Concerne les récepteurs radiophoniques à usage domestique ou à usage général analogue utilisés dans des locaux secs et destinés à être reliés au réseau de distribution soit directement, soit par l'intermédiaire d'appareils auxiliaires. Traite exclusivement de la sécurité des récepteurs radiophoniques et des appareils auxiliaires.

- 65-1 (1955) Annexe I. Spécifications particulières pour amplificateurs reliés à un réseau de distribution d'énergie.

31 p. 4.— Fr. s.

Étend le domaine d'application de la Publication 65 aux amplificateurs.

- 65-2 (1955) Annexe II. Spécifications particulières pour haut-parleurs indépendants.

23 p. 4.— Fr. s.

Étend le domaine d'application de la Publication 65 aux haut-parleurs indépendants.

- 65-3 (1960) Annexe III. Spécifications particulières pour récepteurs de télévision reliés à un réseau de distribution d'énergie.

24 p. 4.— Fr. s.

Étend le domaine d'application de la Publication 65 aux récepteurs de télévision reliés à un réseau de distribution d'énergie.

67 (1954) Dimensions des tubes électroniques.

1^{re} édition 1954 comprenant les 1^{er} et 2^e suppléments.

97 p. 15.— Fr. s.

Indique les dimensions avec les tolérances nécessaires des embases, des douilles et des culots des tubes électroniques et les calibres et procédés de calibrage correspondants, afin de permettre l'interchangeabilité. Contient également des recommandations pour la préparation des dessins de tubes électroniques destinés à figurer dans cette publication. Cette publication est composée de feuillets détachables. La C.E.I. publie de temps en temps de nouvelles feuilles et des feuilles révisées.

1^{er} supplément (1955) 2.— Fr. s.

2^e supplément (1957) 8.— Fr. s.

3^e supplément (1958) 6.— Fr. s.

4^e supplément (1960) 6.— Fr. s.

5^e supplément (1962) 7,50 Fr. s.

- 68 : — Essais fondamentaux climatiques et de robustesse mécanique recommandés pour les pièces détachées pour matériel électronique.
Décrit les essais généraux normalisés, climatiques et mécaniques des pièces détachées pour les matériels de télécommunication et pour les dispositifs électroniques basés sur des techniques analogues, en vue de déterminer leur aptitude à fonctionner dans des conditions d'emploi variées et à être transportées et stockées.
Cette publication est éditée en deux parties :
- 68-1 (1960) 1^{re} partie : Généralités.
28 p. 8.— Fr. s.
Contient des indications d'ordre général concernant l'exécution des essais.
 - 68-2 (1960) 2^e partie : Essais.
64 p. 18.— Fr. s.
Décrit les différents essais en détail. Cette partie est publiée sous forme de fascicules détachables ; des suppléments paraîtront de temps à autre.
- 69 (1954) Méthodes recommandées pour les mesures sur les récepteurs radiophoniques pour émissions de radiodiffusion à modulation d'amplitude.
91 p. 10.— Fr. s.
Recommande les conditions et les méthodes de mesure pour l'estimation et la comparaison des performances des récepteurs radiophoniques pour émissions sonores de radiodiffusion à modulation d'amplitude établis pour la réception sur haut-parleurs dans la gamme de fréquences comprise entre 150 kHz et 26,1 MHz, que ces récepteurs soient alimentés par le réseau ou par piles.
Constitue simplement un catalogue de mesures sélectionnées pour évaluer les propriétés essentielles des récepteurs d'un type déterminé et ne stipule aucun critère de qualité.
- 78 (1961) Impédances caractéristiques et dimensions des câbles coaxiaux pour fréquences radioélectriques.
11 p. 3.— Fr. s.
Indique les impédances caractéristiques et les diamètres sur diélectrique des câbles coaxiaux pour fréquences radioélectriques.
- 86 : — Piles électriques.
Applicable aux piles sèches, avec pour objet l'énumération des modèles répondant aux besoins les plus courants, la définition de leurs caractéristiques afin d'en assurer l'interchangeabilité, et la limitation de leur nombre. Cette publication sera éditée en trois parties.

Première partie : Généralités.

Deuxième partie : Feuilles de spécifications.

Troisième partie : Organes de connexion.

- 91 (1958) Méthodes recommandées pour les mesures sur les récepteurs radiophoniques pour émissions de radiodiffusion à modulation de fréquence.

90 p. 15.— Fr. s.

Recommande les conditions et les méthodes de mesure pour l'estimation et la comparaison du fonctionnement des récepteurs radiophoniques pour émissions sonores de radiodiffusion à modulation de fréquence établis pour la réception sur haut-parleurs dans la gamme de fréquences comprise entre 87,5 MHz et 108 MHz, que ces récepteurs soient alimentés par le réseau ou par batteries.

Constitue simplement un catalogue de mesures sélectionnées pour évaluer les propriétés essentielles des récepteurs d'un type donné et ne stipule aucun critère de qualité.

- 96 : — Câbles pour fréquences radioélectriques.

Etablit des prescriptions pour les câbles coaxiaux flexibles ou semi-flexibles ainsi que pour les conducteurs du type jumelé (ou en paires) pour fréquences radioélectriques destinés à être utilisés dans les équipements de radiocommunication et dans les systèmes électroniques basés sur des techniques analogues. Le diélectrique de ces câbles peut être du type massif, aéré ou semi-aéré et réalisé avec un diélectrique constitué par une résine thermo-plastique polymérisée à faibles pertes, un mélange thermodurcissable ou une matière minérale.

Pour les valeurs des impédances caractéristiques normalisées, voir la Publication 78.

Cette publication est éditée en deux parties :

- 96-1 (1962) 1^{re} partie : Prescriptions générales et méthodes de mesure.

65 p. 21.— Fr. s.

Etablit des conditions uniformes d'appréciation des propriétés électriques, climatiques et mécaniques des câbles utilisés aux fréquences radioélectriques et décrit des méthodes d'essai.

- 96-2 (1961) 2^e partie : Spécifications particulières de câbles. 32 p. 12.— Fr. s.

Consiste en plusieurs feuilles de spécifications, publiées sous forme de feuillets détachables ; des suppléments paraîtront de temps à autre.

- 97 (1957) Recommandations relatives aux paramètres fondamentaux pour la technique des câblages imprimés.

7 p. 2.— Fr. s.

Concerne un système de grille fondamentale utilisé dans la technique des câblages imprimés destinés aux appareils de télécommunication et aux appareils électroniques basés sur des techniques analogues, dans lequel les trous utilisés pour la fixation des sorties des pièces détachées ont des diamètres normalisés et des centres situés aux points d'intersection de la grille fondamentale. Prescrit les intervalles nominaux de la grille, le diamètre nominal des trous et indique les épaisseurs préférentielles des plaques en matière plastique laminée pour câblage imprimé. Contient également quelques renseignements relatifs aux pièces détachées utilisées avec des câblages imprimés.

- 100 (1962) Méthodes de mesure des capacités entre électrodes des tubes électroniques.

53 p. 15.— Fr. s.

Concerne la mesure des capacités entre électrodes des tubes appartenant aux classes suivantes : tubes de réception, tubes à rayons cathodiques, tubes à gaz, tubes photoélectriques et photomultiplicateurs, tubes à vide de puissance.

- 106 (1959) Méthodes recommandées pour les mesures de rayonnement sur les récepteurs radiophoniques pour émissions de radiodiffusion à modulation d'amplitude et à modulation de fréquence et sur les récepteurs de télévision.

34 p. 9.— Fr. s.

Contient la description de méthodes d'essai normalisées pour déterminer le rayonnement des récepteurs de radiodiffusion et de télévision, afin de permettre la comparaison des résultats des mesures de rayonnement obtenues par différents opérateurs. Les valeurs des performances acceptables ne sont pas spécifiées. Elle est divisée en deux sections :

- Mesures de rayonnement aux fréquences inférieures à 30 MHz
- Mesures de rayonnement aux fréquences comprises entre 30 MHz et 300 MHz.

- 106A(1962) Complément à la Publication 106 (1959).

15 p. 6.— Fr. s.

Spécifie la méthode de mesure de rayonnement, à la fréquence intermédiaire et à ses harmoniques, dans la gamme de 30 MHz à 300 MHz, des récepteurs à modulation de fréquence fonctionnant dans la gamme de 88 MHz à 108 MHz. Concerne, en outre, une extension de la méthode générale de mesure de rayonnement de ces récepteurs à la gamme de 300 MHz à 1000 MHz.

- 107 (1960) Méthodes recommandées pour les mesures sur les récepteurs de télévision.

151 p. 25.— Fr. s.

Décrit des méthodes de mesure des propriétés électriques, acoustiques et optiques des récepteurs de télévision établis pour la réception d'images en noir et blanc de définition égale à 405, 525, 625 et 819, et de modulation positive ou négative avec la réception du son correspondante, à modulation d'amplitude ou de fréquence. Elle a pour objet de constituer un catalogue de mesures sélectionnées recommandées pour évaluer les propriétés essentielles d'un récepteur d'un type donné et ne stipule aucun critère de qualité.

- 108 (1959) Recommandations pour condensateurs à diélectrique en céramique Type I.

51 p. 10.— Fr. s.

Applicable aux condensateurs fixes à diélectrique en céramique d'un type convenant spécialement à l'utilisation dans les circuits résonants ou pour d'autres applications qui exigent de faibles pertes et une grande stabilité de capacité, mais à l'exclusion des condensateurs pour des courants à fréquences radioélectriques supérieurs à 1 A ou de puissance réactive supérieure à 200 var, destinés au matériel de télécommunication et aux dispositifs électroniques basés sur des techniques analogues. Etablit des règles uniformes pour l'appréciation des propriétés mécaniques, électriques et climatiques des condensateurs, décrit les méthodes d'essais et spécifie un code de couleurs pour l'indication des valeurs de capacité et de tolérances. Contient des recommandations pour leur classification en catégories d'après leur aptitude à supporter les conditions spécifiées dans la Publication 68.

- 110 (1959) Recommandations concernant les condensateurs de puissance soumis à des fréquences comprises entre 100 et 20.000 Hz. 23 p. 6.— Fr. s.

Applicable aux condensateurs de fréquences comprises entre 100 et 20.000 Hz et aux ensembles de condensateurs du type précité formant une installation complète avec leurs accessoires, destinés à être raccordés à un réseau alternatif autre que les réseaux de distribution et servant à améliorer le facteur de puissance et à modifier les caractéristiques d'un circuit, par exemple la fréquence pour laquelle il est accordé. Prescrit les conditions d'emploi de ces condensateurs, des règles de sécurité, des règles pour les essais et les caractéristiques nominales. Contient également des directives pour l'installation et l'utilisation.

- 115 (1959) Recommandations pour résistances fixes non bobinées Type I destinées aux appareils électroniques.

35 p. 8.— Fr. s.

Applicable aux résistances fixes non bobinées Type I, ayant une dissipation nominale inférieure ou égale à 2 watts et une résistance nominale comprise entre 10 ohms et 10 mégohms et

destinées au matériel de télécommunication et aux dispositifs électroniques basés sur des techniques analogues.

Etablit des règles uniformes pour l'appréciation des propriétés mécaniques, électriques et climatiques des résistances, décrit les méthodes d'essai et donne des recommandations pour la normalisation de leurs dimensions et pour leur classification en catégories d'après leur aptitude à supporter les conditions spécifiées dans la Publication 68.

- 117 : — Symboles graphiques recommandés.
Enumère les symboles graphiques recommandés pour l'ensemble de l'électrotechnique, tant pour le courant fort que pour le courant faible. Remplace les publications 35 : Signes graphiques pour installations à courant fort, et 42 : Signes graphiques pour installations à courant faible.
Cette publication est éditée sous forme de fascicules séparés ; chaque fascicule traite d'un domaine déterminé.
- 122 : — Quartz pour oscillateurs.
Applicable aux quartz destinés aux circuits oscillateurs. Cette publication est éditée en trois parties :
- 122-1 (1962) Section un : Valeurs et conditions normalisées. Section deux : Conditions de mesures et d'essais.
43 p. 12.— Fr. s.
Etablit des règles uniformes pour l'appréciation des propriétés mécaniques, électriques et climatiques des quartz, décrit les méthodes de mesure et d'essai, donne des recommandations pour la normalisation de leurs caractéristiques et dimensions et pour leur classification en catégories d'après leur aptitude à supporter des conditions extrêmes de température, d'humidité, de pression ou de contraintes mécaniques et donne des directives pour l'utilisation et l'entretien des quartz dans les oscillateurs. Donne des informations générales et spécifie les méthodes de mesure et d'essai communes à tous les modèles de quartz pour oscillateurs.
 - 122-2 (1962) Section trois : Guide d'emploi des quartz pour oscillateurs.
56 p. 15.— Fr. s.
Donne des indications permettant d'utiliser au mieux les quartz pour oscillateurs.
 - 122-3 (1962) Section quatre : Encombrements normaux.
22 p. 7,50 Fr. s.
Fascicule à feuillets détachables contenant des feuilles particulières concernant les dimensions et la désignation des boîtiers de quartz.
Des suppléments seront édités de temps à autre. Cette partie comprendra également éventuellement, la section cinq : Connexions à broches, et la section six : Feuilles particulières.

- 124 (1960) Recommandations concernant les impédances nominales et les dimensions des haut-parleurs.
8 p. 3.— Fr. s.
Concerne les haut-parleurs à rayonnement direct, à un seul conducteur mobile. Prescrit les valeurs des impédances nominales du conducteur mobile (à l'exclusion du transformateur) et les dimensions et la disposition des trous de fixation.
- 125 (1961) Classification générale des matériaux en oxydes ferromagnétiques et définition des termes.
29 p. 9.— Fr. s.
Contient une classification des matériaux en oxydes ferromagnétiques ; vise à l'uniformisation des termes et des définitions d'emploi général dans ce domaine. Groupe une quarantaine de termes accompagnés de leurs définitions répartis en cinq sections : perméabilité, pertes, variabilité, magnétostriction, résistivité.
- 130 : — Connecteurs utilisés aux fréquences jusqu'à 3 MHz.
Applicable aux connecteurs destinés au matériel de télécommunication et aux dispositifs électroniques basés sur des techniques analogues. Son objet est d'établir des règles uniformes pour apprécier les propriétés électriques, climatiques et mécaniques des connecteurs ainsi que leur conformité aux règles de sécurité, de décrire des méthodes d'essai, d'assurer l'interchangeabilité et la compatibilité et de classer les connecteurs en catégories d'après leur aptitude à supporter des conditions extrêmes de température et d'humidité. Non applicable aux types de connecteurs destinés exclusivement à relier un appareil au réseau de distribution d'énergie ni aux connecteurs étudiés spécialement pour être utilisés à des fréquences supérieures à 3 MHz. Cette publication sera éditée en plusieurs parties.
- 130-1 (1962) 1^{re} partie : Règles générales et méthodes de mesure.
53 p. 15.— Fr. s.
Concerne la terminologie, la classification en catégories, la valeur de la tension nominale et la valeur du courant nominal, la désignation du type, les essais de type, les conditions normalisées pour les essais, l'examen visuel, les lignes de fuite et les distances dans l'air, les essais électriques, les essais mécaniques et les essais climatiques.
- 130-2 (1962) 2^e partie : Connecteurs pour récepteurs de radio-diffusion et équipements électroacoustiques similaires.
25 p. 7,50 Fr. s.
Contient les règles spéciales concernant les connecteurs pour récepteurs de radiodiffusion et équipements électroacoustiques similaires. Applicable aux types de connecteurs suivants : connecteur pour antenne et terre (modulation d'amplitude),

connecteur pour connexion d'antenne symétrique, connecteur pour connexion d'antenne asymétrique, connecteur pour haut-parleur à basse impédance, pour haut-parleur à haute impédance, pour microphone, pour électrophone et magnétophone. Ces connecteurs sont établis sur les principes suivants : la distance entre les centres des contacts est un multiple entier de l'écartement de la grille fondamentale donné dans la Publication 97 de la C. E. I., les contacts étant placés en ligne droite et les contacts mâles comportant une section rectangulaire. Les connecteurs femelles conviennent au montage direct sur les plaquettes de circuits imprimés. La conception des connecteurs est telle que ces derniers conviennent pour être utilisés avec les appareils pour lesquels les règles de sécurité de la C. E. I. (en particulier celles de la Publication 65) sont applicables.

- 134 (1961) Systèmes de valeurs limites pour les tubes électroniques et les dispositifs à semi-conducteurs analogues.

9 p. 3.— Fr. s.

Décrit les systèmes de valeurs limites utilisés pour les tubes électroniques et les dispositifs à semi-conducteurs analogues. Son objet est de faciliter la compréhension de ces systèmes, particulièrement en ce qui concerne le partage des responsabilités entre le fabricant de dispositifs électroniques et les utilisateurs.

- 135 (1961) Numérotation des électrodes et désignation des sections des tubes électroniques.

9 p. 3.— Fr. s.

Applicable aux tubes à plusieurs électrodes à l'exception des tubes à rayons cathodiques. Donne la méthode utilisée pour numéroter les électrodes de même type des tubes à plusieurs électrodes et pour désigner les sections des tubes à plusieurs sections.

- 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.

32 p. 10.— Fr. s.

Applicable plus particulièrement aux antennes de réception avec leurs lignes d'alimentation associées pour la réception d'ondes à polarisation rectiligne dans la gamme de fréquence de 30 MHz à 1000 MHz. A pour objet la normalisation des conditions et des méthodes de mesure sur les antennes de réception, de façon à permettre la comparaison des résultats des mesures obtenus par différents observateurs. Constitue un catalogue de mesures sélectionnées recommandées pour évaluer les propriétés électriques des antennes d'un type donné mais ne stipule aucun critère de qualité.

- 139 (1962) Préparation des dessins d'encombrement des tubes à rayons cathodiques de mesure et de télévision.
15 p. 4,50 Fr. s.
Contient des règles pour la préparation des dessins d'encombrement des tubes à rayons cathodiques, ayant pour but d'encourager la présentation uniforme des publications dans les divers pays. Des exemples de dessins types sont donnés dans cette publication.

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

- R.I. 13 Compte rendu de la réunion plénière tenue à Bruxelles, 1956.
Textes français et anglais en fascicules séparés.
107 p. en français, 104, p. en anglais, 15.— Fr. s. par fascicule.
- R.I. 14 Compte rendu de la réunion plénière tenue à La Haye, 1958.
Textes français et anglais en fascicules séparés.
154 p. en français, 152 p. en anglais, 25.— Fr. s. par fascicule.
- C.I.S.P.R. 1 (1961) Spécification de l'appareillage de mesure C.I.S.P.R. pour les fréquences comprises entre 0,15 et 30 MHz
43 p., 12.— Fr. s.
Spécifie les caractéristiques techniques d'un appareillage de mesure des perturbations radioélectriques pour les fréquences comprises entre 0,15 MHz et 30 MHz et fixe les prescriptions à respecter lors de la mesure des différentes sortes de perturbations radioélectriques.
- C.I.S.P.R. 2 (1961) Spécification de l'appareillage de mesure C.I.S.P.R. pour les fréquences comprises entre 25 et 300 MHz.
38 p., 12.— Fr. s.
Spécifie les caractéristiques techniques d'un appareillage de mesure des perturbations radioélectriques pour les fréquences comprises entre 25 MHz et 300 MHz et fixe les prescriptions à respecter lors de la mesure des différentes sortes de perturbations radioélectriques.

Renseignements pour l'achat de publications de la C.E.I.

- 1) Les publications de la C.E.I. paraissent sous la forme de brochures bilingues, dont les deux textes, français et anglais, sont imprimés sur les pages en regard.

2) Il y a lieu d'indiquer avec précision le numéro de la publication commandée, notamment si la commande porte sur des publications éditées en plusieurs parties (p. ex. 34, 50, 56, 68, 70, 72, 117, etc.). Si la commande d'une publication éditée en plusieurs parties mentionne uniquement le numéro de la série complète, toutes les parties de cette publication seront fournies (p. ex. si la commande indique simplement « Publication 34 » les trois parties, à savoir 34-1, 34-2 et 34-3, seront expédiées).

En cas de doute possible, prière de mentionner le titre intégral de la publication ainsi que son numéro.

3) Les publications de la C.E.I. sont en vente au Bureau Central de la C.E.I. (Service de vente des publications) 1, rue de Varembe, Genève, Suisse.

4) Les prix indiqués dans le présent catalogue ne sont valables que pour les commandes passées directement au Bureau Central de la C.E.I. Ces prix sont ceux appliqués lors de l'impression du catalogue et resteront valables jusqu'à épuisement des stocks. Le prix de certaines publications anciennes pourra être augmenté s'il est nécessaire de procéder à une réimpression. Il est à noter que la présente édition du catalogue annule les éditions antérieures.

Les frais de port et d'emballage sont facturés pour toute commande.

Les publications peuvent être payées en bons U.N.E.S.C.O.

INTERNATIONAL ELECTROTECHNICAL COMMISSION (I. E. C.)

Publications

We have quoted from the « Catalogue of Publications, of the I.E.C. the following publications which may be of some interest to our readers.

Publications marked with an asterisk (*) are under revision and a new edition is expected to be published shortly.

- 27 (1953) International letter symbols used in connection with electricity (Quantity symbols, alphabets and letter types).
15 pp. 3.— Fr. s.
Lists letter symbols used in electricity and gives rules for their use and combination. Specifies alphabets and letter types to be used.
- 50 : — International Electrotechnical Vocabulary.
A glossary of the terms, with their definitions, in English and French used in electrical engineering. The equivalent terms only are given in Dutch, German, Italian, Polish, Swedish and Spanish. Separate indices of the terms are given for each of the eight languages. The vocabulary is issued in the form of separate booklets, each dealing with a specific field.
- 50 (07) (1956) Electronics.
157 pp. 12.— Fr. s.
 - 50 (20) (1958) Scientific and industrial measuring instruments.
88 pp. 9.— Fr. s.
 - 50 (62) (1961) Waveguides.
46 pp. 8.— Fr. s.
- 65 (1962) Safety requirements for electric mains-operated radio receiving apparatus.
48 pp. 5.— Fr. s.
Amendment 1 (1958).
11 pp. 2.— Fr. s.
This specification has been drawn up in complete agreement between the I.E.C. and the C.E.E. (International Commission for the Regulation and Control of Electrical Equipment) and supersedes the C.E.E. Publication of June 1948 on the same subject.
It is identical with C.E.E. Publication No. 1. Applies to radio receiving apparatus for domestic or similar general use in dry locations for connection to the supply mains either directly or through the intermediary of auxiliary apparatus. Concerns only the safety aspects of radio receiving apparatus and auxiliary apparatus.
- 65-1 (1955) Appendix I. Particular specification for electric mains-operated amplifiers.
31 pp. 4.— Fr. s.
Extends Publication 65 to cover electric mains-operated amplifiers.
 - 65-2 (1955) Appendix II. Particular specification for independent loud-speakers.
23 pp. 4.— Fr. s.
Extends Publication 65 to cover independent loudspeakers.

- 65-3 (1960) Appendix III. Particular specification for electric mains operated television receiving apparatus.
24 pp. 4.— Fr. s.
Extends Publication 65 to cover electric mains-operated television receivers.
- 67 (1954) Dimensions of electronic tubes and valves.
1st edition 1954 including the 1st and 2nd supplements.
97 pp. 15.— Fr. s.
Gives the dimensions with the necessary tolerances, of electronic tube and valves bases, holders and caps, together with the relevant gauges and gauging procedure, to ensure interchangeability. Gives also recommended practice for the preparatory of drawings of electronic tubes and valves intended to be included in this publication. This is a loose-leaf publication and supplements containing new and revised sheets are issued from time to time.
1st supplement (1955) 2.— Fr. s.
2nd supplement (1957) 8.— Fr. s.
3rd supplement (1958) 6.— Fr. s.
4th supplement (1960) 6.— Fr. s.
5th supplement (1962) 7,50 Fr. s.
- 68 : — Recommended basic climatic and mechanical robustness testing procedure for components for electronic equipment.
Describes a standard general procedure for climatic and mechanical robustness tests, designed to assess the durability, under various conditions of use, transport and storage, of components used in equipment for telecommunication and in electronic equipment employing similar techniques.
This publication is issued in two parts, as follows :
 - 68-1 (1960) Part 1. General.
28 pp. 8.— Fr. s.
General description of the framework of the test procedure and how it is to be used.
 - 68-2 (1960) Part 2. Tests.
64 pp. 18.— Fr. s.
Describes the different tests in detail. This part is issued in loose-leaf form and supplements will be issued from time to time.
- 69 (1954) Recommended methods of measurement on receiver for amplitude-modulation broadcast transmissions.
91 pp. 10.— Fr. s.
Recommends conditions and methods of measurement for assessing and comparing the performances of radio receivers for amplitude-modulation sound broadcasting designed for loud-

speaker reception in the frequency range between 150 kHz (kc/s) and 26.1 MHz (Mc/s) and applies both to mains and battery operated receivers. Constitutes only a catalogue of selected measurements for assessing the essential properties of receivers of a given type and does not lay down criteria of quality.

- 78 (1961) Characteristic impedances and dimensions of radio-frequency coaxial cables.

11 pp. 3.— Fr. s.

Lays down the characteristics impedances and diameters over dielectric of radio-frequency coaxial cables.

- 86 : — Primary cells and batteries.

Applies to dry primary cells and batteries with the object of enumerating the types corresponding to the most current needs, defining their characteristics, ensuring their interchangeability and limiting their number.

This publication will be issued in three parts, as follows :

Part 1 : General.

Part 2 : Specification sheets.

Part 3 : Terminals.

- 91 (1958) Recommended methods of measurement on receivers for frequency-modulation broadcast transmissions.

90 pp. 15.— Fr. s.

Recommends conditions and methods of measurement for assessing and comparing the performances of radio receivers for frequency-modulation sound broadcasting designed for loud-speaker reception in the frequency range between 87.5 MHz (Mc/s) and 108 MHz (Mc/s), and applies to both mains and battery operated receivers.

Constitutes only a catalogue of selected measurements for assessing the essential properties of receivers of a given type and does not lay down criteria of quality.

- 96 : — Radio-frequency cables.

Lays down requirements for flexible or semi-flexible radio-frequency cables of coaxial or twin conductor types designed for use in radio-communication equipment and in electronic devices employing similar techniques. The dielectric may be of the solid, or semi-air-spaced types, consisting of a thermo-plastic of lowloss polymeric resin or of a thermosetting compound, or of a mineral material.

For standard characteristic impedances and dimensions, see Publication 78. This publication is issued in two parts, viz.

- 86-1 (1962) Part I. General requirements and measuring methods.

65 pp. 20.— Fr. s.

Establishes uniform requirements for judging the electrical climatic and mechanical properties of radio-frequency cables and describes test methods.

— 96-2 (1961) Part 2. Relevant cable specifications.

32 pp. 12.— Fr. s.

Loose leaf booklet containing specification sheets for I.E.C. radio-frequency cables. Supplements will be issued from time to time.

97 (1957) Recommendations for fundamental parameters for printed wiring techniques.

7 pp. 2.— Fr. s.

Relates to a basic grid system for printed wiring techniques used in telecommunication equipment and electronic devices using similar techniques, in which the holes for the terminations of components have standardized diameters and the centres of which lie on the cross points of the basic grid. Lays down the nominal spacing of the grid, the nominal diameter of the holes and gives preferred thicknesses of the laminated plastic boards for printed wiring. Also gives some indications concerning components for use with printed wiring.

100 (1962) Methods for the measurement of direct interelectrode capacitance of electronic tubes and valves.

53 pp. 15.— Fr. s.

Applies to the measurement of the direct interelectrode capacitances of electronic tubes and valves of the following types : receiving tubes and valves, cathode-ray tubes, gas tubes and gas-filled valves, phototubes, photocells and multiplier types, high-power vacuum tubes and valves.

106 (1959) Recommended methods of measurement of radiation from receivers for amplitude-modulation, frequency-modulation and television broadcast transmissions.

34 pp. 9.— Fr. s.

Contains descriptions of standardized methods of test for determining the radiation from broadcast radio and television receivers to enable comparison of the results of radiation measurements obtained by different observers. Limiting values of the various quantities for acceptable performance are not specified. Contains the following sections : measurement of radiation at frequencies below 30 MHz (Mc/s), and measurement of radiation at frequencies between 30 and 300 MHz (Mc/s).

106A(1962)Supplement to Publication 106 (1959).

15 pp. 6.— Fr. s.

Lays down the procedure for measuring the radiation at the intermediate frequency and its harmonics, in the range 30 MHz

(Mc/s) to 300 MHz (Mc/s), from frequency-modulation receivers operating in the range 88 MHz (Mc/s) to 108 MHz (Mc/s). Also deals with the extension of the general method of measurement of radiation from these receivers to the range 300 MHz (Mc/s) to 1000 MHz (Mc/s).

- 107 (1960) Recommended methods of measurement on receivers for television broadcast transmissions.

151 pp. 25.— Fr. s.

Describes methods of measuring the electrical, accoustic and optical properties of television broadcast receivers designed for monochrome vision reception of 405, 525, 625 and 819 line transmissions, of either negative or positive modulation and the associated a. m. or f. m. sound channel. Constitutes only a catalogue of selected measurements for assessing the essential properties of receivers of a given type and does not lay down criteria of quality.

- 108 (1959) Recommendations for ceramic dielectric capacitors Type I. 51 pp. 10.— Fr. s.

Applies to fixed ceramic dielectric capacitors of a type specifically suited for resonant circuit application or any other applications where low losses and high stability of capacitance are essential, but excluding capacitors for r. f. currents exceeding 1A or for a reactive power exceeding 200 var, for telecommunication equipment and in electronic devices employing similar techniques.

Lays down uniform requirements for judging the mechanical, electrical and climatic properties of these capacitors, describes test methods and gives a colour code for the marking of values of capacitance and tolerance. Includes recommendations for classification into groups according to the ability of capacitors to withstand conditions as specified in Publication 68.

- 110 (1959) Recommendations for power capacitors for frequencies between 100 and 20.000 Hz (c/s).

23 pp. 6.— Fr. s.

Applies to power capacitor units and assemblies of such units complete with accessories forming complete capacitor equipments, for connection to a. c. circuits, other than power-frequency distribution systems, with a frequency between 100 and 20 000 Hz (c/s) for use for power-factor correction and other modifications of circuit characteristics, such as frequency adjustment. Lays down conditions of use, safety requirements, quality requirements, tests and ratings. Also gives guidance on installation and operation.

- 115 (1959) Recommendations for fixed non-wirewound resistors Type I for use in electronic equipment.

35 pp. 8.— Fr. s.

Applies to fixed resistors of types other than wirewound, with a rated dissipation not exceeding 2 watts and a rated resistance value between 10 ohms and 10 megohms, suitable for use in circuits where high stability properties are essential, for telecommunication equipment and electronic devices using similar techniques.

Lays down uniform requirements for judging the mechanical, electrical and climatic properties of the resistors, describes test methods and gives recommendations for classification into groups according to the ability of the resistors to withstand conditions as specified in Publication 68.

117 : — Recommended graphical symbols.

Lists graphical symbols for the whole field of electrical engineering, including both the heavy and light current branches. Supersedes Publication 35 : Graphical symbols for heavy-current systems, and 42 : Graphical symbols for weak-current systems. This publication is issued in the form of separate booklets each dealing with a specific field.

122 : — Quartz crystal units for oscillators.

Relates to quartz crystal units intended to be used in oscillator circuits.

This publication is issued in three parts, viz.

— 122-1 (1962) Section one : Standard values and conditions. Section two : Test conditions.

43 pp. 12.— Fr. s.

Lays down uniform conditions for assessing the mechanical, electrical and climatic properties of quartz crystal units, describes test methods, gives recommendations for standard values and dimensions and for classification into groups according to their ability to withstand extremes of temperature, humidity, pressure or mechanical stress and gives guidance on the use and maintenance of crystal units in oscillators. Gives general information and general methods of test common to all types of quartz crystal units for oscillators.

— 122-2 (1962) Section three : Guide to the use of quartz oscillator crystals.

56 pp. 15.— Fr. s.

Gives guidance on the use of quartz oscillators so that the crystal units may be used to their best advantage.

— 122-3 (1962) Section four : Standard outlines.

23 pp. 7.50 Fr. s.

Loose leaf booklet containing standard sheets on crystal holder dimensions and designations. Supplements will be issued from time to time. This part is also to contain at a later date. Section five : Pin connections, and Section six : Article sheets.

- 124 (1960) Recommendations for the rated impedances and dimensions of loudspeakers.
8 pp. 3.— Fr. s.
Applies to single moving-coil loudspeakers of the direct radiator type. Lays down values of the rated impedance of the moving coil (transformer excluded) and the size and arrangement of the fixing holes.
- 125 (1961) General classification of ferromagnetic oxide materials and definitions of terms.
29 pp. 9.— Fr. s.
Contains a classification of ferromagnetic oxide materials and lays down uniform terms and definitions for general use in this field. Includes some 40 terms and definitions divided into five sections : permeability, losses, variability, magnetostriction, resistivity.
- 130 : — Connectors used for frequencies below 3 MHz (Mc/s).
Applies to connectors for use in equipment for telecommunication and in electronic devices employing similar techniques. Its object is to establish uniform requirements for the electrical, climatic and mechanical properties of connectors as well as safety aspects, to lay down test methods, to ensure interchangeability and compatibility and to classify connectors into groups according to their ability to withstand extremes of temperature and humidity. Does not apply to those types of connectors exclusively intended for the connection of mains supply voltage to an appliance, nor to those essentially designed for use at frequencies exceeding 3 MHz (Mc/s).
This publication is issued in a number of parts.
- 130-1 (1962) Part I. General requirements and measuring methods.
53 pp. 15.— Fr. s.
Deals with terminology, classification into groups, values of rated voltage and of rated current, type designation, type tests, standard conditions for testing, visual inspection, clearances and creepage distances, electrical tests, mechanical tests and climatic tests.
- 130-2 (1962) Part 2. Connectors for radio receivers and associated sound equipment.
25 pp. 7.50 Fr. s.
Contains the particular requirements for connectors for radio receivers and associated sound equipment. The following types of connectors are covered : aerial and earth (a. m.), balanced aerial connection, unbalanced aerial connection, low impedance loudspeaker, high impedance loudspeaker, microphone and gramophone or tape recorder. The design of these connectors

is based on the centre distance of the contacts being a whole multiple of the basic grid for printed wiring as given in I.E.C. Publication 97, the contacts being placed in a straight line, and the male contacts being of rectangular cross-section. The connectors with female contacts are suitable for direct mounting to printed wiring boards. The design of the connectors is such that they are suitable for use with apparatus where I.E.C. safety requirements (in particular I.E.C. Publication 65) apply.

- 134 (1961) Rating systems for electronic tubes and valves and analogous semiconductor devices.

9 pp. 3.— Fr. s.

Describes rating systems in use for electronic tubes and valves and analogous semiconductor devices. Its object is to bring about a greater understanding of these systems, especially in the division of responsibility between the manufacturer and the circuit designer.

- 135 (1961) Numbering of electrodes and designation of units in electronic tubes and valves.

9 pp. 3.— Fr. s.

Applies to multi-electrode tubes and valves, with the exception of cathode-ray tubes. Describes the system used for numbering the electrodes of the same type in multi-electrode tubes and valves and for assigning designations to the units of multiple-unit tubes and valves.

- 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).

32 pp. 10.— Fr. s.

Applies more particularly to aerials with their associated feeders for the reception of linearly polarized waves in the frequency range from 30 MHz (Mc/s) to 1000 MHz (Mc/s). Its object is to standardize the conditions and methods of measurement on receiving aerials, so as to make possible the comparison of the results of measurements obtained by different observers. Constitutes a catalogue of selected measurements for assessing the electrical properties of aerials of a given type, does not lay down criteria of quality.

- 139 (1962) Preparation of outline drawings of oscilloscope and picture tubes.

15 pp. 4.50 Fr. s.

Lays down rules for the preparation of outline drawings of cathode-ray tubes with the object of encouraging the same practice when publications are prepared in different countries.

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

- R.I. 13 Report of the plenary session held in Brussels, 1956.
French and English texts in separate volumes.
107 pp. French, 104 pp. English, 15.— Fr. s. per volume.
- R.I. 14 Report of the plenary session held in The Hague, 1958.
French and English texts in separate volumes.
154 pp. French, 152 pp. English, 25.— Fr. s. per volume.
- C.I.S.P.R. 1 (1961) Specification for C.I.S.P.R. radio interference measuring apparatus for the frequency range 0.15 Mc/s to 30 Mc/s.
43 pp. 12.— Fr. s.
Gives the technical characteristics of a radio interference measuring set for the frequency range 0.15 Mc/s to 30 Mc/s and describes its use for the measurement of different kinds of radio interference.
- C.I.S.P.R. 2 (1961) Specification for C.I.S.P.R. radio interference measuring apparatus for the frequency range 25 Mc/s to 300 Mc/s.
38 pp. 12.— Fr. s.
Gives the technical characteristics of a radio interference measuring set for the frequency range 25 Mc/s to 300 Mc/s and describes its use for the measurement of different kinds of radio interference.

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In case of doubt, the full title should be quoted in addition to the reference number.

(3) I.E.C. Publications may be purchased either direct from Central Office of the I.E.C. (Sales Department) 1, rue de Varembe, Geneva, Switzerland.

(4) The prices quoted in this catalogue apply only to direct sales from the I.E.C. Central Office. The prices shown are correct at the time of printing of the catalogue and will apply as long as stocks are available. The price of certain of the older publications may be increased if reprinting becomes necessary. It is to be noted that this edition of the catalogue supersedes the previous issues.

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BIBLIOGRAPHIE

Commission Electrotechnique Internationale

Publication 61. Deuxième édition. — Culots de lampes et douilles ainsi que calibres pour le contrôle de l'interchangeabilité et de la sécurité.

Prix : Fr. s. 45.— l'exemplaire plus frais de port.

Publication 99-2. Première édition. — Parafoudres. Deuxième partie : Parafoudres à expulsion.

Prix : Fr. s. 30.— l'exemplaire plus frais de port.

Publication 60. Deuxième édition. — Essais à haute tension.

Prix : Fr. s. 30.— l'exemplaire plus frais de port.

Publication 137. Première édition. — Traversées isolées pour tensions alternatives supérieures à 1000 V.

Prix : Fr. s. 15.— l'exemplaire plus frais de port.

Publication 67. Sixième supplément. — Dimensions de tubes électroniques.

Cette publication est éditée sous forme d'un recueil de feuilles détachées.

Le sixième supplément comprend les feuilles de normes suivantes, prévues pour être incorporées au volume :

Embases et culots.

- Chemises de culot octal.
- Culots 8 C 15-A et B.
- Calibre pour les culots 8 C 15.
- Embase plate à 5 broches.
- Calibre pour embase plate à 5 broches.

Formes des tubes électroniques.

- Encombrement des tubes subminiatures A7 × 10 à embase 7L7.
- Encombrement des tubes subminiatures A 10-11 à fils alignés.
- Encombrement de tubes à culot octal, sans coiffe.
- Encombrement de tubes à culot octal, avec coiffe.

Calibres spéciaux pour tubes à rayons cathodiques.

- Calibre de ligne de référence G-110.
- Calibre de ligne de référence G-116.
- Calibre de ligne de référence G-126.

Prix : Fr. s. 6.— l'exemplaire plus frais de port.

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

BIBLIOGRAPHY

International Electrotechnical Commission

Publication 61. Second edition. — Lamp caps and holders together with gauges for the control of interchangeability and safety.

Price : Sw. Fr. 45.— per copy plus postage.

Publication 99-2. First edition. — Lightning arresters. Part 2 : Expulsion-type lightning arresters.

Price : Sw. Fr. 30.— per copy plus postage.

Publication 60. Second edition. — High-voltage test techniques.

Price : Sw. Fr. 30.— per copy plus postage.

Publication 137. First edition. — Bushings for alternating voltages above 1000 V.

Price : Sw. Fr. 15.— per copy plus postage.

Publication 67. Sixth supplement. — Dimensions of electronic tubes and valves.

This publication is in loose leaf form and the following Standard Sheets are included in the sixth supplement for insertion in the loose leaf folder :

Bases.

- Shells of octal base.
- B8H base.
- B8H pin and spigot position gauge.
- 5-pin flat base.
- 5-pin flat base gauge.

Outlines.

- T2 × 3 subminiature outlines.
- Inline lead T3 subminiature outline.
- Tube and valve outlines with octal bases and without top cap.
- Tube and valve outlines with octal bases and with top cap.

Special gauges for cathode-ray tubes.

- G-110 reference line gauge.
- G-116 reference line gauge.
- G-126 reference line gauge.

Price : Sw. Fr. 6.— per copy plus postage.

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

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