
International Scientific Radio Union

U. R. S. I.

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XIIth GENERAL ASSEMBLY

Submission of Reports and Individuals Papers

It should be recalled that the General Secretary cannot promise to distribute reports and papers reaching the General Secretariat after the following dates :

May, 15 : Sub-Commission Reports and individual papers ;

June, 15 : National Committee and Commission Reports.

NATIONAL COMMITTEES

India

RADIO PROPAGATION UNIT

The National Physical Laboratory has issued the first Progress Report on the Radio Propagation Unit.

The Unit was created on April 1, 1956, with the technical staff attached to the Secretariat of the Radio Research Committee (Indian National Committee for U.R.S.I.). Its programme for 1956 included preparation of Ionospheric Data and Prediction Bulletins, study of the problems of high atmospheric physics, radio astronomy and application of radio astronomical techniques to the study of the ionosphere and low frequency radio propagation.

The report contains information on the following projects :

1. Coordination, analysis and publication of ionospheric data.
2. Preparation of forecasts of radio propagation conditions.
3. Measurement of ionospheric absorption using cosmic radio noise.
4. Measurement of ionospheric drift from scintillation of radio stars.
5. Propagation of low frequency radio waves.
6. Physics of the Upper Atmosphere.
7. Solar-terrestrial relationships.
8. Solar Radio Noise.

Japan

NEW PRESIDENT

The Science Council of Japan has appointed Prof. Dr. Issac Koga as President of the Japanese National Committee to succeed to Prof. Dr. Y. Hagihara.

The address of the new chairman is : Dr. Issac Koga, Electrical Engineering Department, Faculty of Engineering, University of Tokyo, Tokyo.

Poland

NEW PRESIDENT

The Polish Academy of Sciences has appointed Prof. Dr. Janusz Groszkowski, Vice-President of the Academy, as President of the Polish National Committee of U.R.S.I. to succeed to Prof. P. Szulkin who has resigned.

COMMISSIONS

Commission II On Tropospheric Radio

LETTER TO OFFICIAL MEMBERS OF COMMISSION II

21 February 1957.

Dear Sir,

At the request of Dr. R. L. Smith-Rose, President of Commission II, I am sending you the proposed agenda for the meetings of the Commission.

In addition to the usual national reports to be prepared by the Official Members of the Commission, Dr. Smith-Rose would like to invite specific contributions to any of the items detailed in the agenda. Authors should make it quite clear to which items their report or paper refers, so that these can be arranged conveniently for presentation and discussion at the appropriate sessions.

Contributors are reminded of the facts (See *U.R.S.I. Information Bulletin*, n° 95) :

- (i) That papers are restricted to a maximum length of 1500 words and three diagrams, and
- (ii) That papers should include a short summary of 25 to 100 words according the importance of the paper.
- (iii) That these papers will not be published, but will be referred to by title only in the Proceedings of the General Assembly.
- (iv) That papers should be sent *in duplicate* to the General Secretary before May 1st, 1957.

AGENDA

Session.

1. *Opening Session* :

- (i) Review of National Reports.
- (ii) Reports of Working Groups.
- (iii) State of publications.

2. *Tropospheric Propagation within the Horizon :*

- (i) Irregular terrain and mixed path transmission at V.H.F. and above.
- (ii) Effects of troposphere on propagation.

3. *Tropospheric Propagation beyond the Horizon :*

- (i) Obstacle gain phenomena.
- (ii) Refraction effects.
- (iii) Reflection at tropospheric discontinuities.
- (iv) Scattering in troposphere.

4. *Radio and meteorology :*

- (i) Meteorological factors in relation to 2 and 3; including radio refractometer investigations.
- (ii) Application of radio to meteorology, including problems in cloud and precipitation physics.

5. *Joint session with Commission III on « Propagation by Scattering ».*

6. *C.C.I.R. Matters.*

7. *Review of Progress and Resolutions for General Assembly.*

Yours Sincerely,

The Secretary General.

Commission III

On Radio and Ionospheric

IONOSPHERIC SOUNDING TECHNIQUES

We want to mention the following reports issued by the U.S.A. National Bureau of Standards :

- 5032, Examples of the use of letter symbols in ionospheric soundings reduction.
- 5033, Summary of changes in ionospheric vertical soundings observing and scaling procedures, effective 1 January, 1957.
- 5038, Graphical summary of variations in monthly median f_oF_2 .
- 5043, Inventory of ionograms on file at the Boulder Laboratories of the National Bureau of Standards.

Commission VI
On Radio Waves and Circuits

SUB-COMMISSION VI.2. — ON CIRCUIT THEORY

Letter to Official Members of Commission VI

January 19th 1957.

Dear Sir,

I want to communicate to you the plans of sub-commission VI.2 for the coming General Assembly.

In The Hague there was an unanimous opinion that sessions should be used primary for discussions of papers distributed well in advance. The contents of the papers should tend towards the discussion of broad problems rather than towards isolated specialized topics. To achieve this end a survey paper will be prepared that aims to give an exposure of the fundamentals, the broad problems, the results and the trends of circuit theory. It is hoped that it will be possible to distribute this paper early enough so that a session of the sub-commission could, after a short summary of the paper, be wholly devoted to the discussion of it.

Besides this, other papers on circuit theory may be presented if they deal with the connection of circuits with « radio » and have an « international » or « fundamental » character. I ask your cooperation in order that only papers on circuit theory, satisfying these demands, are presented for discussion in Boulder. In the main, all papers to be considered by Commission VI shall be in the hands of the Secretary General in duplicate by May 1. Only in exceptional cases will it be possible to accept papers after this date. You are requested also to provide the Chairman of Commission VI, Professor Dr. S. Silver, the Vice-Chairman Mr. J. Loeb and me as Chairman of Sub-Commission VI.2 with copies of such papers.

If you have any remarks in connection with the above or that may be helpful for the preparation of the sessions on circuit theory, I will be very glad to hear from you.

Sincerely yours.

(sgd) B. D. H. TELLEGEN.
Chairman Sub-Commission VI.2,
Philip Research Laboratories,
Eindhoven, Netherlands

Commission VII On Radioelectronics

TO OFFICIAL MEMBERS OF THE COMMISSION

February 6, 1957.

Dear Colleague,

This letter concerns the meetings of Commission VII of the International Scientific Radio Union which are to be held this summer between August 22nd and September 5th at Boulder, Colorado. As we agreed last year, there will be four meetings but the exact dates of the meetings are still uncertain, since they must be set in relation to the wishes of the other six Commissions that make up the General Assembly.

In my last circular letter of September 19th, I was able to tell you about our plans but the organization for the meetings was not complete ; I am happy to be able to say that we now have a complete organization, but of course much still remains to be done in the matter of ensuring that our topics will be discussed adequately. The table which follows will inform you about Topics, about the Chairmen who are responsible for the organization of each of the meetings, and about the Discussion Leaders who will present the central paper around which the meetings are organized.

<i>Topic</i>	<i>Discussion Leader</i>	<i>Chairman</i>
The Physics of the Cathode	Dr. L. S. Nergaard, Radio Corp. of America, R C A Laboratories, Princeton, New Jersey, U. S. A.	Dr. W. G. Shepherd, Dept. of Electrical Engineering, Institute of Technology, Univer- sity of Minnesota, Min- neapolis 14, Minn., U. S. A.
The Physics of Semi-Conducting Devices for Radio Application	Dr. Wm. Shockley, Shockley Semiconduc- tor Laboratory, Beck- man Instruments Inc. 391, South San Antonio Rd., Mountain View, California, U. S. A.	Dr. M. Tannenbaum, Murray Hill Laborato- ries, Bell Telephone, Laboratories Inc., Mur- ray Hill, New Jersey, U. S. A.

<i>Topic</i>	<i>Discussion Leader</i>	<i>Chairman</i>
The Source and Nature of Noise in Electron Beams	Dr. J. R. Pierce, Murray Hill Laboratories, Bell Telephone Labs. Inc. Murray Hill, New Jersey, U. S. A.	Prof. A. Blanc-Lapierre, Faculté des Sciences, Université d'Alger, Alger
Oscillation Phenomena in Gas Discharges	Dr. P. W. Allis, Massachusetts Institute of Technology, Cambridge Mass., U. S. A.	Dr. J. L. H. Jonker, Technical University, Eindhoven, Aalsterweg, 391, Eindhoven, Netherlands

Each of the discussion leaders has agreed to furnish an abstract of his speech by the 1st of May; I have undertaken to have these abstracts reproduced in sufficient quantity so that I can send each of you one or two copies sometime early in May. Copies of the speech itself will be reproduced and distributed after the meeting at Boulder.

The success of the meetings depends largely on the efforts of the National Chairmen of Commission VII; without their cooperation, the chairmen of the meetings (for example, Dr. Shepherd in connection with the Physics of the Cathode) can do little to ensure that new research results are brought to the meetings by representatives from all the various countries and that these results are discussed in detail. As National Chairman of Commission VII for your country, would you help make these meetings a success by acting on the following suggestions :

1. Collect research results pertaining to our four topics from the various laboratories in your own country. Organize the results into such form that the delegate from your country can present them at the appropriate meeting; although formal papers are not to be presented, results organized in the form of lantern slides would be most helpful.

2. Write to each of the chairmen of the meetings in which you have results to present (for example, write to Dr. Tannenbaum if you have results related to solid state devices). In your letter give the chairman the following information :

- (a) The names of the delegates who are to represent your country at the meetings of Commission VII.

(b) A brief digest of the nature of the researches that your delegate will present.

This information is absolutely necessary before the chairman can plan the meeting.

In this letter I would like to introduce you to the Chairmen of the four meetings : Dr. Jonker, our Vice-President whom you all know, Dr. Blanc-Lapierre and Dr. Shepherd, whom many of you have met at U.R.S.I. meetings, and Dr. Tannenbaum who is with us for the first time. Formal introductions must wait until we are all at Boulder, but this letter can serve as a temporary substitute. I have given these gentlemen the names of all the National Chairmen and they will be writing to you from time to time. They have a difficult task before them, but I know from the cooperation that you have given me in the past that you will share the difficulties with them.

Sincerely yours,

(sgd) G. A. WOONTON,
Chairman, Commission VII,
The Eaton Electronics Research Laboratory,
McGill University, Montreal, Canada.

U.R.S.I./A.G.I. Committee

LETTERS

To Sir Edward Appleton.

February 13, 1957.

Dear Sir Edward,

I have the honor to present to you, the Chairman of the International Geophysical Year Committee of U.R.S.I., a copy of the first report of the Special Committee on World-wide Ionospheric Soundings ⁽¹⁾, which was submitted to and approved in substance

⁽¹⁾ See *Inf. Bull.*, n° 99, pp. 48-89.

by your Committee at its third meeting in Brussels on August 31, 1956.

We were particularly glad to have had your advice and assistance on the days immediately following in working out some of the refinements and questions of detail for the final version of the report.

In view of the delegation by the XI General Assembly to your committee of responsibility for taking necessary action before the next General Assembly in the matter of procedures concerning the production, reduction and presentation of results of ionospheric soundings, it is generally understood among the members of my Special Committee and its consultants, very broadly representative of this branch of radio science, that this first report has the status of a report adopted by a General Assembly.

I am sending copies of this letter to the President of U.R.S.I., the Chairman of Commission III, the C.S.A.G.I. Reporter for Ionosphere and the General Secretary of U.R.S.I. and C.S.A.G.I.

Sincerely yours,

(sgd) A. H. SHAPLEY,

Chairman U.R.S.I./A.G.I.

Special Committee on World-wide Soundings.

To A. H. Shapley, Esq.

22nd February, 1957.

My dear Chairman,

I acknowledge the safe receipt of your letter of 13th February and of the first Report of the Special Committee on World-wide Ionospheric Soundings which has been prepared under your Chairmanship. On behalf of the parent U.R.S.I./I.G.Y. Committee, which delegated the responsibility of preparing this report to your Committee, I wish to express our warm appreciation of the skill and care with which this difficult task has been discharged. The report will introduce an entirely new measure of homogeneity and regularity into ionogram production and reduction, thus ensuring the chief benefit which concerted observations during the I.G.Y. can yield.

At the same time your recommendations are practical and realistic, such as could only have been made by people with great experience in the subject.

In view of the remit to the U.R.S.I./A.G.I. Committee you may certainly assume that the Report has the authority of U.R.S.I. endorsement, to come into operation as from 1st January, 1957.

I was glad to learn, by another route, that your Committee will continue to watch the operation, in practice, of your recommendations, over the preparatory period before the I.G.Y. actually starts. This further service will be most valuable.

Yours very sincerely,

(sgd) EDWARD V. APPLETON,
Chairman U.R.S.I./A.G.I., Committee.

AMATEUR RADIO TRANSMITTING STATIONS

At its meeting in September 1956 the U.R.S.I.-A.G.I. Committee considered the above matter and the Secretary of the Committee (Dr. W. J. G. Beynon) sent a telegram to the U.R.S.I. delegate (Dr. R. L. Smith-Rose) at the C.C.I.R. Assembly which was meeting at that time in Warsaw (see *U.R.S.I. Bulletin*, n° 99, p. 35).

The position as far as C.C.I.R. is concerned is given in the following reply received from Dr. Smith-Rose.

18th March, 1957.

Dear Beynon,

I am writing in response to your letter of 5th March concerning the telegram on « Amateur Radio Transmitting Stations and the I.G.Y. » reproduced on page 35 of *U.R.S.I. Information Bulletin* n° 99.

1. The Director of the C.C.I.R. has confirmed what I told you verbally viz., that the C.C.I.R. cannot take any action in this matter which is outside their competence.

2. The formal position concerning the use of amateur stations for communication purposes is defined in the following extract from the Radio Regulations annexed to The International Telecommunication Convention, Atlantic City, 1947.

« CHAPTER XVI ». — Miscellaneous Stations and Services.

Article 42. — *Amateur Stations.*

« 1000 para. 1. — Radiocommunications between amateur stations of different countries shall be forbidden if the administration

of one of the countries concerned has notified that it objects to such radiocommunications.

1001 *para.* 2 (1). — When transmissions between amateur stations of different countries are permitted they must be made in plain language and must be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified. It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties.

1002 (2). — The preceding provisions may be modified by special arrangements between the countries concerned.

..... »

3. From the above explanation of the position you will appreciate that it is open to National Committees concerned with the work of the I.G.Y. to take action may be appropriate to use amateur transmitting stations for communicating results from an isolated observatory or station to the nearest point on a public communications network. In general it is not in order for amateur transmitting stations to deal with such communications in circumstances where public services are available.

Yours sincerely,

(*sgd*) R. L. SMITH-ROSE.

ATMOSPHERIC STATION MANUAL

4th List

The following information is given in this manual :

1. Geographical coordinates.
2. Geomagnetic coordinates.
3. Characteristics measured.
4. Type of apparatus.
5. Frequencies and bandwidths.
6. Other stations of the network.
7. Operating schedule.
8. Publication of results.
9. Responsible authority.
10. Date of report.

In the previous lists the following stations have been mentioned (Numbers between brackets are the numbers of the *Information Bulletin*).

Accra (99)	Cook (101)	Halifax (100)
Aden (99)	Cyprus (99)	Hemsby (100)
Akita (100)		
Angmassalik (99)	Delhi (99)	Irvinestown (100)
	Dourbes (99)	Ivato (100)
Bagneux (99)	Dunedin (99)	
Bangui (99)	Dunstable (99)	Johannesburg (100)
Bill (101)	Durban (99)	
Brest (99)		
Brisbane (99)	Falkland Is (100)	Kerguelen (100)
Byrd Station (101)	Fanning Is (100)	Knob Lake (101)
	Frobisher Bay (100)	Kumamoto (100)
Camborne (99)	Front Royal (101)	Léopoldville (100)
Churchill (100)		
Colombo (99)	Godhavn (101)	Leuchars (100)

Mabashi (100)	Oohira (100)	Rabat (101)
Maui (100)	Ottawa (101)	Rio-de-Janeiro (101)
Mayebashi (100)	Panama (101)	Saskatoon (101)
	Panska Ves (101)	Singapore (101)
Narssaq (100)	Poitiers (101)	Slough (101)
Nederhorst den Berg	Poona (101)	Stockholm (101)
	(100) Prùhonice (101)	Tahiti (101)

In this number we are giving information on :

Anchorage	Fairbanks	Kühlungsborn
	Father Point	
Battle Creek		Macquarie Is.
Bermuda	Gainesville	Nome
Boulder		
	Hanover	Port Lockroy
Cape Horn	Huancayo	Potsdam

We would appreciate to be informed of any errors in the information published.

ANCHORAGE

1. N 61°10' W 149°55'.
2. +60.9° (1956) 258.1° (1956).
3. Whistlers and dawn chorus.
4. Magnetic tape recording. Absolute time scale good to ± 0.05 sec. provided. Equipment designed by Stanford University.
5. 400 c/s to 30 kc/s available. Upper frequency limit used may be lower as determined by requirements.
6. Boulder, Stanford, Seattle, Fairbanks, Unalaska, Nome, Wellington, Dunedin, Macquarie Is., Saskatoon, Saskatchewan.
7. 2 minutes per hour commencing at 35 min. past the hour. Other schedules available by arrangement.
8. Summary subjective results periodically.
9. C.R.P.L., National Bureau of Standards, Boulder, Colorado, U. S. A.
International coordination; Radio Propagation Laboratory, Stanford University, Stanford, California, U. S. A.
10. January 1957.

BATTLE CREEK

1. N 42°16' W 85°10'.
2. +53.2° (1956) 339.7° (1956).
3. Whistlers and dawn chorus.
4. Magnetic tape recording. Absolute time scale good to ± 0.05 sec provided. Equipment designed by Dartmouth College.
5. Three-db bandwidth : 500 c/s to 16 kc/s at 19 cm/s recording speed ; to 20 kc/s at 38 cm/s recording speed (down 9 db at 25 kc/s, 13 db at 30 kc/s).
6. Thule, Godhavn, Frabisher Bay, Knab Lake, Father Point, Cape Horn, Port Lockroy, Weddell Sea, Hanover, Washington, Bermuda, Gainesville, Huancayo, Ottawa, Halifax.
Sferics direction finding provided by U. S. Air Force Air Weather Service stations in Newfoundland, Washington, Florida, Bermuda and the Azores.
7. 2 min. every hour commencing at 35 min. past the hour.
8. Subjective results twice a month as per C.S.A.G.I. Manual.
9. Dartmouth College.
International coordination : Thayer School of Engineering, Dartmouth College, Hanover, New Hampshire, U. S. A.
10. January 1957.

BERMUDA

1. N 32°22' W 64°40'.
2. +43.8° (1956) 5.2° (1956).
3. Whistlers and dawn chorus.
4. Magnetic tape recording. Absolute time scale good to ± 0.05 sec. provided. Equipment designed by Dartmouth College.
5. Three-db bandwidth : 500 c/s to 16 kc/s at 19 cm/s recording speed ; to 20 kc/s at 38 cm/s recording speed (down 9 db at 25 kc/s, 13 db at 30 kc/s).
6. Thule, Godhavn, Frobisher Bay, Knob Lake, Father Point, Hanover, Battle Creek, Washington, Gainesville, Huancayo, Cape Horne, Port Lockroy, Weddell Sea, Ottawa, Halifax.
Sferics direction finding provided by U. S. Air Force Air Weather

Service stations in Newfoundland, Washington, Florida, Bermuda and the Azores.

7. 2 minutes per hour commencing at 35 min. the hour.

8. Subjective results twice a month as per C.S.A.G.I. Manual.

9. Air Force Air Weather Service,
Washington D. C., U. S. A.

International Coordination : Thayer School of Engineering,
Dartmouth College, Hanover, New Hampshire, U. S. A.

10. January 1957.

BOULDER

1. N 40°02' W 105°18'.

2. +48.9° (1956) 316.4° (1956).

3. (a) Mean power of radio noise.

(b) Whistlers and dawn chorus. Sferics direction finding.

4. (a) U. S. National Bureau of Standards Model ARN-2.

(b) Magnetic tape recording. Direction finding data on photographic film. Absolute time scale good to ± 0.05 sec. provided. Equipment designed by Stanford University.

5. (a) Eight frequencies logarithmically spaced from 50 kc/s to 20 Mc/s.

Three-db noise bandwidth approximatively 300 c/s at each frequency.

(b) 400 c/s to 30 kc/s available. Upper frequency limit used may be lower as determined by requirements.

6. (a) Accra, Bill, Byrd Station, Cook, Front Royal, India, Johannesburg, Maui, Panama Canal Zone, Rabat, Rio de Janeiro, Singapore, Stockholm, Thule, Tokyo.

(b) Stanford, Seattle, Anchorage, Fairbanks, Unalaska, Nome, Wellington, Dunedin, Macquarie Is., Saskatoon, Saskatchewan.

7. (a) Continuous operation.

(b) 2 minutes per hour commencing 35 min. past the hour. Other schedules available by arrangement.

8. (a) Quarterly by C.R.P.L.

(b) Summary subjective results periodically.

9. (a) C.R.P.L., National Bureau of Standards.

Boulder Colorado, U. S. A.

International coordination : C.R.P.L.

(b) C.R.P.L.

International coordination : Radio Propagation Laboratory, Stanford University, Stanford, California, U. S. A.

10. January 1957.

CAPE HORN

1. S 55° W 70°.

(Exact site not yet determined).

2. —43.5° (1956) 359.3° (1956).

3. Whistlers and dawn chorus.

4. Magnetic tape recording. Absolute time scale good to ± 0.05 sec. provided. Equipment designed by Dartmouth College.

5. Three-db bandwidth : 500 c/s to 16 kc/s at 19 cm/s recording speed ; to 20 kc/s at 38 cm/s recording speed (down 9 db at 25 kc/s, 13 db at 30 kc/s).

6. Thule, Godhavn, Frobisher Bay, Knob Lake, Father Point, Hanover, Battle Creek, Washington, Bermuda, Gainesville, Huancayo, Port Lockroy, Weddell Sea, Ottawa, Halifax.

Sferics direction-finding provided by U. S. Air Force Air Weather Service stations in Newfoundland, Washington, Florida, Bermuda, and the Azores.

7. 2 minutes per hour commencing at 35 min. past the hour.

8. Subjective results twice a month as per C.S.A.G.I. manual.

9. Dartmouth College,

Hanover, New Hampshire, U. S. A.

International coordination : Thayer School of Engineer, Dartmouth College.

10. January 1957.

FAIRBANKS

1. N 64°51' W 147°50'.

2. +64.7° (1956) 256.5° (1956).

3. Whistlers and dawn chorus.

4. Magnetic tape recording. Absolute time scale good to ± 0.05 sec. provided. Equipment designed by Stanford University.

5. 400 c/s to 30 kc/s available. Upper frequency limit used may be lower as determined by requirements.

6. Boulder, Stanford, Seattle, Anchorage, Unalaska, Nome, Wellington, Dunedin, Macquarie Is., Saskatoon, Saskatchewan.

7. 2 minutes per hour commencing at 35 min. past the hour. Other schedules available by arrangement.

8. Summary subjective results periodically.

9. Geophysical Institute,
University of Alaska.

College, Alaska, U. S. A.

International coordination : Radio Propagation Laboratory,
Stanford University, Stanford, California, U. S. A.

10. January 1957.

FATHER POINT

1. N 48°05' W 68°05'.

2. +59.6° (1956) 1.2° (1956).

3. Whistlers and dawn chorus.

4. Magnetic tape recording. Absolute time scale good to ± 0.05 sec. provided. Equipment designed by Dartmouth College.

5. Three-db bandwidth : 500 c/s to 16 kc/s at 19 cm/s recording speed ; to 20 kc/s at 38 cm/s recording speed (down 9 db at 25 kc/s, 13 db at 30 kc/s).

6. Thule, Godhavn, Frobisher Bay, Knob Lake, Hanover, Battle Creek, Washington, Bermuda, Gainesville, Huancayo, Cape Horn, Port Lokroy, Weddell Sea, Ottawa, Halifax.

Sferics direction finding provided by U. S. Air Force Air Weather Service stations in Newfoundland, Washington, Florida, Bermuda and the Azores.

7. 2 minutes every hour commencing at 35 min. past the hour.

8. Subjective results twice a month as per C.S.A.G.I. Manual.

9. Dartmouth College.

International Coordination : Thayer School of Engineering,
Dartmouth College, Hanover, New Hampshire, U. S. A.

10. January 1957.

GAINESVILLE

1. N 29°38' W 82°18'.
2. +40.8° (1956) 344.7° (1956).
3. Whistlers and dawn chorus.
4. Magnetic tape recording. Absolute time scale good to ± 0.05 sec. provided. Equipment designed by Dartmouth College.
5. Three-db bandwidth : 500 c/s to 16 kc/s at 19 cm/s recording speed ; to 20 kc/s at 38 cm/s recording speed (down 9 db at 25 kc/s, 13 db at 30 kc/s).
6. Thule, Godhavn, Frobisher Bay, Knob Lake, Father Point, Hanover, Battle Creek, Washington, Bermuda, Huancayo, Cape Horn, Port Lockroy, Weddell Sea, Ottawa, Halifax.
Sferics direction finding provided by U. S. Air Force Air Weather Service stations in Newfoundland, Washington, Florida, Bermuda, and the Azores.
7. 2 minutes per hour commencing at 35 min. past the hour.
8. Subjective results twice a month as per C.S.A.G.I. Manual.
9. Air Force Air Weather Service,
Washington, D. C., U. S. A.
International coordination : Thayer School of Engineering,
Dartmouth College, Hanover, New Hampshire, U. S. A.
10. January 1957.

HANOVER

1. N 43°42' W 72°18'.
2. +55.2° (1956) 355.8° (1956).
3. Whistlers and dawn chorus.
4. Magnetic tape recording. Absolute time scale good to ± 0.05 sec. Equipment designed by Dartmouth College.
5. Three-db bandwidth : 500 c/s to 16 kc/s at 19 cm/s recording speed, to 20 kc/s at 38 cm/s recording speed (down 9 db at 25 kc/s, 13 db at 30 kc/s).
6. Thule, Godhavn, Frobisher Bay, Knob Lake, Father Point, Cape Horn, Port Lockroy, Weddell Sea, Battle Creek, Washington, Bermuda, Gainesville, Huancayo, Ottawa, Halifax.

Sferic direction finding provided by U. S. A. Air Force Air Weather Service Stations in Newfoundland, Washington, Florida, Bermuda and the Azores.

7. 2 minutes per hour commencing at 35 minutes past the hour.
8. Subjective results twice a month as per C.S.A.G.I. Manual.
9. Dartmouth College,
Hanover, New Hampshire, U. S. A.
10. International Cooperation : Thayer School of Engineering,
Dartmouth College, Hanover, New Hampshire, U. S. A.
10. January 1957.

HUANCAYO

1. S 12°03' W 75°20'.
2. -0.6° (1956) 354.8° (1956).
3. Whistlers and dawn chorus.
4. Magnetic tape recording. Absolute time scale good to ± 0.05 sec. provided. Equipment designed by Dartmouth College.
5. Three-db bandwidth : 500 c/s to 16 kc/s at 19 cm/s recording speed ; to 20 kc/s at 38 cm/s recording speed (down 9 db at 25 kc/s, 13 db at 30 kc/s).
6. Thule, Godhavn, Frobisher Bay, Knob Lake, Father Point, Hanover, Battle Creek, Washington, Bermuda, Gainesville, Cape Horn, Port Lockroy, Weddell Sea, Ottawa, Halifax.

Sferics direction-finding provided by U. S. Air Force Air Weather Service station in Newfoundland, Washington, Florida, Bermuda, and the Azores.

7. 2 minutes every hour commencing at 35 min. past the hour.
8. Subjective results twice a month as per C.S.A.G.I. manual.
9. Instituto Geofisico de Huancayo,
Apartado 46, Huancayo, Peru.
- International coordination : Thayer School of Engineering,
Dartmouth College, Hanover, New Hampshire, U. S. A.
10. January 1957.

KÜHLUNGSBORN

1. N 54°07' E 11°46'.
2. +54.4° (1956) 96.8° (1956).

3. (a) Mean field strength of LF atmospheric noise ($\mu\text{V/m}$).
- (b) Number of LF atmospherics counted above a level of $50 \mu\text{V/m}$.
- (c) Number of LF atmospherics, counted above levels of 5, 10, 20 and 40 db over $50 \mu\text{V/m}$.
- (d) VHF atmospheric noise.
- (e) Whistling atmospherics.
4. LF recording receivers and pulse counters,
VHF radiomaximograph,
Magnetic tape recording set.
5. (a) 26 kc/s; bandwidth 500 c/s.
- (b) 14 kc/s, 26 kc/s and 40 kc/s; bandwidth 500 c/s.
- (c) 26 kc/s; bandwidth 500 c/s.
- (d) 100 Mc/s.
- (e) 100 c/s-12 kc/s.
6. Potsdam, Leipzig, Praha.
7. (a) to (d) continuous recordings 00.00-24.00.
- (e) 5 minutes every hour.
8. Monthly Bulletin « Geophysikalische Messreihen des Observatoriums Kühlungsborn ».
9. Doz. Dr. E. A. Lauter, Observatorium Kühlungsborn des Meteorologischen und Hydrologischen Dienstes des Deutschen Demokratischen Republik.
10. February 1957.

MACQUARIE IS

1. S $54^{\circ}30'$ W $158^{\circ}45'$.
- 2.
3. Whistlers and dawn chorus.
4. Magnetic tape recording. Absolute time scale good to ± 0.05 sec. provided. Equipment designed by Stanford University.
5. 400 c/s to 30 kc/s available. Upper frequency limit used may be lower as determined by requirements.
6. Boulder, Stanford, Seattle, Anchorage, Fairbanks, Unalaska, Nome, Dunedin, Wellington, Saskatoon, Saskatchewan.

7. 2 minutes per hour commencing at 35 min. past the hour.
Other schedules available by arrangement.

8. Summary subjective results periodically.

9. University of Queensland,
Brisbane, Queensland, Australia.

International coordination : Radio Propagation, Laboratory,
Stanford University, Stanford, California, U. S. A.

10. January 1957.

NOME

1. N 64°30' W 165°26'.

2. +61.0° (1956) 242.1° (1956).

3. Whistlers and dawn chorus.

4. Magnetic tape recording. Absolute time scale good to
 ± 0.05 sec. provided. Equipment designed by Stanford University.

5. 400 c/s to 30 kc/s available. Upper frequency limit used
may be lower as determined by requirements.

6. Boulder, Stanford, Seattle, Anchorage, Fairbanks,
Unalaska, Wellington, Dunedin, Macquarie Is., Saskatoon,
Saskatchewan.

7. 2 minutes every hour commencing at 35 min. past the hour.
Other schedules available by arrangement.

8. Summary subjective results periodically.

9. Geophysical Institute.

University of Alaska,
College, Alaska, U. S. A.

International coordination : Radio Propagation Laboratory,
Stanford University, Stanford, California, U. S. A.

10. January 1957.

PORT LOCKROY

1. S 64°49' W 63°33'.

2. -53.4° (1956) 3.9° (1957).

3. Whistlers and dawn chorus.

4. Magnetic tape recording. Absolute time scale good to
 ± 0.95 sec. provided. Equipment designed by Dartmouth College.

5. Three-db bandwidth : 500 c/s to 16 kc/s at 19 cm/s recording speed ; to 20 kc/s at 38 cm/s recording speed (down 9 db at 25 kc/s, 13 db at 30 kc/s).

6. Thule, Godhavn, Frobisher Bay, Knob Lake, Father Point, Hanover, Battle Creek, Washington, Bermuda, Gainesville, Huancayo, Cape Horn, Weddell Sea, Ottawa, Halifax.

Sferics direction-finding provided by U.S. Air Force Air Weather Service stations in Newfoundland, Washington, Florida, Bermuda and the Azores.

7. 2 minutes per hour commencing at 35 min. past the hour.

8. Subjective results when available as per C.S.A.G.I. manual.

9. Falkland Islands Dependency Survey,

4, Millbank, London SW 1, England.

International coordination : Thayer School of Engineering, Dartmouth College, Hanover, New Hampshire, U. S. A.

10. January 1957.

POTSDAM

1. N 52°25' E 13°04'.

2. +52.5° (1956) 97.2° (1956).

3. Localisation of atmospheric centres, study of waveforms.

4. (a) Narrow-beam direction-finder.

(b) Cathode-ray direction-finder.

(c) Oscillographic photo-recording set.

5. (a) 27 kc/s.

(b) 14 kc/s.

(c) 50 c/s-500 kc/s.

6.

7. (a) Continuous recording 00.00-00.24.

(b-c) 00-30 minutes past 09.00, 12.00, 15.00, 18.00 and 21.00 U. T.

8. Monthly Bulletin « Geophysikalische Messreihen des Observatoriums Kühlungsborn.

9. Dr. S. Skeib, Hauptobservatorium Potsdam des Meteorologischen und Hydrologischen Dienstes der Deutschen Demokratischen Republik.

10. February 1957.

C. C. I. R.

VIIIth Plenary Assembly

(Warsaw, 9 August, 13 September 1956)

We are reproducing from the proceedings published in the Telecommunication Journal (January, 1957, N° 1 and February 1957, n° 2) by Dr. Ernst Metzler, Director, C.C.I.R., the following parts which are related to C.C.I.R.-U.R.S.I. collaboration.

Study Groups Activities

STUDY GROUP N° II. — *Receivers*

Chairman : Mr. Pierre DAVID (France);

Vice-Chairman : Mr. P. ABADIE (France).

Sub-Group A : Mr. T. KILVINGTON (United Kingdom).

Sub-Group B : Professor EGIDI (Italy).

This Study Group extended London Recommendation 94 (noise and sensitivity of receivers) to telegraph receivers, by proposing for these latter a definition of maximum usable sensitivity bearing in mind signal distortion, and determining the parameters to be chosen in the case of signal distortion or mutilation, when defining a reference sensitivity. It drew up, too, a definition of maximum sensitivity for sound or vision broadcasting receivers, and for the measurement of this proposed that the C.C.I.R. be guided by the methods of the IEC.

The Study Group considered advice, suggestions and comments for improving the frequency stability of receivers. On the other hand, it could not reply to the question of the choice of intermediate frequency and the protection against undesired responses of superheterodyne receivers. But it thought it advisable to report on the present position of such investigations. The report shows that no single intermediate frequency for LF, MF and HF sound broadcasting receivers can be completely satisfactory for the

whole of the European area. The Study Group further considered that a careful study should be made of maritime mobile receivers, since on their correct operation depends the safety of life at sea.

Questions 79 : « The responses of radio receivers to quasi impulsive interference » and 80 : « Undesired emissions from receivers » were each the subject of a recommendation that the C.C.I.R. should for the time being abide by the C.I.S.P.R. measurement methods, as regards broadcasting and television receivers. London Recommendation 95 : « Selectivity of receivers » was revised to cover a new concept, that of attenuation on a parasitic frequency.

Study Group II submitted two recommendations to the Assembly, on the sensitivity, selectivity and stability of amplitude-modulation sound broadcasting receivers, and of television receivers and frequency-modulation sound broadcasting receivers. They recommend the C.C.I.R. to abide by the definitions and measurement methods devised by the CEI, in defining these characteristics.

Protection against keyed interference at the receiver end has been deemed useless so long as the transmitter spectrum is not reduced. Hence this matter will be left to Study Group I ; on the understanding that full information on receivers will be submitted to it.

Lastly, at the proposal of Study Group II, the Assembly decided that a new question should be set for study on multiple-path distortion in frequency-modulation receivers.

Thanks so the literature available, the Study Group expanded the annexes to Recommendations 94, 95 and 96.

STUDY GROUP N° III. — *Fixed service systems*

Chairman : Dr. H. C. A. VAN DUUREN (the Netherlands) ;

Vice-Chairman : Mr. A. COOK (United Kingdom).

Sub-Group A : Mr. A. COOK (United Kingdom).

Sub-Group B. — *Chairman* : Mr. J. LENKOWSKI (People's Republic of Poland).

Sub-Group C. — *Chairman* : Mr. J. BOULIN (France).

Question 3, dealing with revision of Atlantic City Recommendation 4, provides for a series of studies designed to determine, for the various services, the conditions to be fulfilled by the equipment used, so as to ensure the most efficient use of spectrum

space. Provision is made for these studies to be carried on without intermission, and for speedy publication of new recommendations or revised versions of old ones. Bearing in mind E. A. R. C. (Geneva, 1951) Recommendation 14, urging a reduction in assignment spacing for the decametric waves, and considering how important it is to have some data about the limits for the signal-to-noise protection ratio, a new Question asks for such data to be assembled for the services in question. Four recommendations were amended as a result of the inquiries. They concern rhombic antenna gain (the antenna characteristics are defined), bandwidths and signal-to-noise ratios, the signal-to-interference protection ratio, and fading margins.

Numerous papers on antenna directivity show that working conditions can be improved by the use of appropriate antennas. But while the main characteristics of antennas are known, information is still lacking on the improvement that may be effected by a directional antenna in a great many cases. The study programme proposed in London was modified in the light of the results obtained and the new proposals submitted.

Papers were submitted on interference caused by radiation from industrial, scientific and medical apparatus. One aspect of this question is dealt with by Study Group I, and part of the question has been considered by the C.I.S.P.R. (Special International Committee on Radio Interference). For the time being, Question 84, which deals with this subject, remains under study without amendment.

Problems arising out of the use of radiotelegraph circuits in conjunction with five-unit start-stop apparatus are also of concern to the C.C.I.T. A question relative to the admissible error rate had been submitted to this latter. The papers received from members, together with the work done by several C.C.I.T. study groups, made possible the issue of a recommendation that, whenever conditions required, a system with automatic repetition should be used. This recommendation also proposes the use of a seven-unit code. Further research into this subject will be conducted in cooperation with the C.C.I.T.

It was at the Geneva Plenary Assembly (1951) that communication theory was for the first time the subject of a C.C.I.R. Question and Study Programme. This problem is being studied,

too, by the International Scientific Radio Union (U.R.S.I.). While papers were in general of a very theoretical nature, they nevertheless made it possible (thanks, too, to the voluminous literature that was assembled) to amend the Question and Study Programme in such a way that work will now centre on more concrete problems, in connection with existing systems, capable of practical application.

A new recommendation defining the information unit was adopted.

STUDY GROUP N° IV. — *Ground-wave propagation*

Chairman : Professor I. SACCO (Italy);

Vice-Chairman : Mr. G. M. MILLINGTON (United Kingdom).

Sub-Group A. — *Chairman* : Mr. G. MILLINGTON (United Kingdom).

Sub-Group B. — *Chairman* : Mr. J. W. HERBSTREIT (United States).

A great deal of time was devoted to propagation over mixed paths. Most of the main phenomena that occur can to-day be theoretically explained, and numerous measurements have confirmed these theories in a general way and to some extent quantitatively. Various methods of calculation lead to comparable results and there are certain data that can be readily applied to practical cases. But in many cases recourse to empirical methods is still necessary. A recommendation summarizes all this. Careful research is still required, especially to determine the influence of the vertical layers of the ground, and in general to devise methods of calculation readily applicable to general use.

The position with regard to the study of propagation over irregular terrain is much the same. Discussion bore on the outcome of the most recent research into diffraction on peaks forming an angle with the wave-fronts, on cylindrical and spherical surfaces, on mountain chains and small objects. The Study Group considered the outcome of experiments with the measurement of fields along varied contours and for different wave-lengths. Many problems still remain to be solved before any conclusions can be drawn which will enable the results to be put into practice. A new, and very full, study programme was drawn up. It deals,

especially, with propagation in valleys, in towns, in the neighbourhood of obstacles (obstacle gain), the possibility of artificially doing away with ground reflections, the most favourable position for antennas, the polarization of waves for particular cases, and the study of phase variations along different propagation paths. The importance of statistical methods for the study of ground-wave propagation was stressed.

A Question was devoted to determination of the action of ground constants, bearing in mind weather conditions and vegetation structure, in relation to wave length.

The discussion on temporal variations in the ground wave on medium waves was resumed. A contribution presented in London seemed to prove that the field variations observed on three different paths were due to absorption by foliage. Measurements made in England and Germany provided material in support of this thesis. For frequencies below 10 Mc/s, tropospheric refraction has a weak influence which a recent series of measurements, has, however, not succeeded in clearly demonstrating.

It should be observed that the prolongation beyond 2000 km of the ground-wave propagation curves between 10 and 300 kc/s requested by the I.F.R.B. has a practical value only in certain special cases, German and American observations having shown that at such distances the wave reflected by the ionosphere is almost always stronger than the ground-wave, even in summer when absorption is most marked.

It was also decided that the atlas which has recently appeared containing ground-wave propagation curves for the 30 to 300 Mc/s band should be expanded by formulae enabling the curves to be transposed for other values of soil conductivity and tropospheric refraction. A new series of propagation curves for frequencies between 30 and 10.000 Mc/s and for antenna height up to 20 km above ground will complete this work.

A new Question asks for an assembly of the main data influencing ground-wave propagation for the most varied uses. Lastly, a Recommendation calls for a uniform graphical representation of antenna radiation diagrams in terms of the new conception of cymomotive force.

STUDY GROUP N° V. — *Tropospheric propagation*

Chairman : Dr. R. I. SMITH-ROSE (United Kingdom);

Vice-Chairman : Mr. E. W. ALLEN (United States).

Sub-Group A. — *Chairman* : Mr. E. W. ALLEN (United States).

Sub-Group B. — *Chairman* : Mr. R. A. ROWDEN (United Kingdom).

Practice has shown in many ways that the London propagation curves (Recommendation N° 111) should be revised. This revision could not be carried out in Warsaw and was placed in the hands of a working party under Dr. Smith-Rose.

Lack of knowledge of the thermodynamic behaviour of the lower atmosphere makes it difficult to give a satisfactory explanation of the various phenomena of tropospheric propagation. A new study programme proposes to determine the correlation between slow or rapid field variations and the changes in the state of the troposphere in the light of different parameters. Direct or indirect methods of measuring the fine structure of the refraction coefficient have been improved. Fading conditions due to the diffraction field of high mountains and to multipath tropospheric propagation were the subject of contributions and discussions. On this subject also, thorough study is still required, particularly on the probable relation between the geometry of the wave path and the intensity of fading in the case of diffraction on high ridges, this point being of special interest to mountainous countries.

It was shown that the immediate surroundings of transmitting and receiving antennas can seriously influence measurements propagation results. A Recommendation taking this into account will make it possible in the future to create similar measurement conditions in different countries and to simplify the interpretation of these measurements.

For the planning of radio relay systems Study Group IX requires statistical data on fading in the different bands and on all possible paths. It is important to know attenuation variations with time both on optical paths (desired signal) and paths beyond the horizon (interference). The results so far obtained give only a few reference points and considerable research is still necessary before a solution can be found. The working programme was altered to allow for experiments on radio relay systems and in future attempts will be made to measure very rapid fading.

It has been noted in the last few years that circuits on metric and decimetric waves, even with a wide band, were possible well beyond the horizon, providing the power was high enough. The cause of this phenomenon must be sought in scattering caused by irregularities in the homogeneity of the troposphere. In various countries, particularly in the United States, an entirely new transmission technique has been evolved. The attention of the I.F.R.B. and of Administrations is specially drawn to these possibilities and the problems to which they give rise, embodied in a Study programme.

STUDY GROUP N° VI. — *Ionospheric propagation*

Chairman : Dr. J. H. DELLINGER (United States);

Vice-Chairman : Dr. D. K. BAILEY (United States).

Sub-Group A. — *Chairman* : Mr. R. I. SMITH-ROSE (United Kingdom).

Sub-Group B. — *Chairman* : Mr. G. MILLINGTON (United Kingdom).

Sub-Group C. — *Chairman* : Mr. W. Q. CRICHLAW (United States).

Sub-Group D. — *Chairman* : Dr. J. GROSSKOPF (Federal German Republic).

Sub-Group E. — *Chairman* : Mr. N. H. ROBERTS (I. F. R. B.).

For several years Study Group VI has been seeking a method of making long-term and medium-term forecasts from the sunspot number or any other basic index. Research carried out by the Director of the C.C.I.R. based on auto-correlation techniques, has not yet produced an entirely satisfactory method and is to be continued. Other studies have shown that an index drawn from characteristics of the F2 layer might be used but its adoption seems premature and the R index will continue to be used for long-term forecasts. The Director of the C.C.I.R. was instructed to organize a service for the prediction of solar activity. The scope of the research has been extended by the adoption of a new Study Programme. As regards short-terms forecasts, a correlation has been found with certain indices of magnetic phenomena and solar flares, allowance for which has been made in a new draft of Study Programme N° 59. Dissemination and exchange of observations for establishing short-term forecasts have already

been organized by the International Scientific Radio Union (U.R.S.I.). The two Reports giving information on this subject were brought up to date and a Resolution draws the attention of U.R.S.I. to the advantages of establishing an improved world network of ionospheric sounding stations at the outcome of the International Geophysical Year (I. G. Y.).

Numerous contributions are devoted to the determination of maximum usable frequencies (basic forecasts for ionospheric propagation) and to the calculation of the space-wave field strength for frequencies above 1500 kc/s. They bring some improvements to the method mainly used nowadays but do not remove the errors which occur in certain cases and which are a considerable drawback to the work of the I.F.R.B. That is why a special working party was instructed to undertake an urgent study of possibilities of improving methods of calculating MUF and LUF in the light of the considerable research already carried out and experience acquired in practice. The Chairman of Study Group VI will also communicate to the I.F.R.B. the results of studies carried out by correspondence and operational information on given circuits. This assistance to the I.F.R.B. is the object of two new Recommendations. A new Study Programme replacing Study Programme N° 115 (London) resumes study of absorption and calculation of field strength for frequencies above 1500 kc/s. Study Programme N° 62, providing for the use of a special modulation of standard frequency transmissions to assess the value or propagation forecasts, has been recast. The study of intermodulation due to non-linear effects in the ionosphere will not be continued and a Resolution requests U.R.S.I. to communicate to the C.C.I.R. the results obtained in this sphere which could lead to important applications.

The propagation of waves on frequencies lower than 1500 kc/s is also of interest to the I.F.R.B. A Report states that, although the numerous measurements made by the European Broadcasting Union (E. B. U.) to some extent confirm the curves used by the I.F.R.B.; other contributions show that under different conditions of time, season, solar activity, these curves are not applicable.

Experience acquired in the field of ionospheric propagation by scatter on frequencies above 30 Mc/s has made it possible to amend the Study Programme on this subject by defining the

points on which the work should bear. A Resolution draws the attention of the I.F.R.B. to the possibility of using this type of propagation for certain fixed services circuits over long distances.

The Study Programme dealing with the measurement of atmospheric radio noise having received a partial reply, it was replaced by a new Study Programme providing inter alia for a worldwide measurement network, also the subject of a Recommendation. Material on atmospheric noise was assembled into a Report which is to be published separately and offered for sale. Some of the work will be done in cooperation with the World Meteorological Organization.

The result of research into fading were assembled in a Report showing that some progress has been made. U.R.S.I. having announced that studies on the ionospheric propagation of circularly polarized waves were being undertaken, London Resolution N° 14 was replaced by a Report.

Study Programme N° 67 (Pulse transmission at oblique incidence) was replaced by two new Study Programmes as the result of measurements so far made. The first of these new Study Programmes concerns the continuation of the measurements while the second provides for the study of back scatter. The Director of the C.C.I.R. will bring these two new Study Programmes to the attention of U.R.S.I., insisting on the urgent need of knowing the results obtained by that body.

In a new Recommendation replacing Recommendation N° 118 the measures of protection to be taken in the interest of radio-astronomy were defined.

The influence of the Doppler effect on long-distance communications at high frequencies using frequency-shift keying is the subject of a new Question.

STUDY GROUP N° VII. — *Standard frequencies and time signals*

Chairman : Mr. B. DECAUX (France);

Vice-Chairman : Prof. BOELLA (Italy).

Sub-Group A. — *Chairman* : Mr. W. D. GEORGE (United States).

Recommendation N° 122 (London) replied to some points in the Question concerning the establishment of a world service of standard frequency transmissions and time signals. At Warsaw,

Study Group VII revised this Recommendation and described the present position in a Report. Standard frequency stations should have an interruption period of at least 4 minutes every hour, and should offer the possibility of direct or indirect comparison with an atomic or molecular frequency standard so that the precision requirements of the frequencies and time intervals transmitted might be satisfied in the best possible way.

Errors occurring during the propagation of standard frequencies and time signals and the need for obtaining a high degree of measurement precision fairly quickly call for further studies. Two new Questions were prepared, one of which deals with standard frequency and time signal transmissions in new frequency bands while the other concerns standard frequency and time signal reception stability. This second Question pays special attention to the Doppler effect. The Annexes to the Report give details of stations already in service or that have been planned in the appropriate bands and outside those bands. Here it should be pointed out that too many stations in a given area may impair the efficiency of the service instead of improving it. For this reason a new Study Programme calls for an investigation into solutions to avoid harmful interference between stations.

Mention should be made of the work of the I.F.R.B. contributing to the clearance of bands reserved exclusively for standard frequencies and time signals.

Reorganizational Measures

It was felt desirable to give a more precise definition of the terms of reference of the Study Groups, as follows :

STUDY GROUP I (*Transmitters*)

1. To make specific studies and proposals in connection with radio transmitters and generally to summarize and coordinate proposals for the rational and economical use of the radio spectrum ;

2. To study a number of problems concerning telegraphy and telephony from the transmission point of view ;

3. To study spurious radiation from medical, scientific and industrial installations.

STUDY GROUP II (*Receivers*)

Measurement of the characteristics of receivers and tabulation of typical values for the different classes of emission and the various services. Investigation of improvement that might be made in receivers in order to solve problems encountered in radiocommunications.

STUDY GROUP III (*Fixed services*)

1. To study questions relating to complete systems for the fixed and allied services and terminal equipment associated therewith. Systems using the so-called ionospheric-scatter mode of propagation, even when working on frequencies above 30 Mc/s, are included ;

2. To study the practical application of communication theory.

STUDY GROUP IV (*Ground wave propagation*)

To study the propagation of radio waves over the surface of the earth, taking into account changes in the electrical constants of the earth and irregularities of terrain, and including the effect of a standard radio atmosphere.

STUDY GROUP V (*Tropospheric propagation*)

To study the influence of the troposphere on radio wave propagation in so far as it concerns radio-communication.

STUDY GROUP VI (*Ionospheric propagation*)

To study all matters relating to the propagation of radio waves through the ionosphere in so far as they concern radio-communication.

STUDY GROUP VII (*Standard frequencies and time signals*)

Organization of a worldwide service of standard frequency and time signal transmissions. Improvement of measurement accuracy.

STUDY GROUP VIII (*International monitoring*)

To study problems relating to the equipment, operation, and methods of measurement used by monitoring stations established

for checking the characteristics of radio frequency emissions. Examples of such measurements are : frequency, field strength, bandwidth, etc.

STUDY GROUP IX (*Radio relay systems*)

To study all aspects of radio relay systems and equipment operating at frequencies above about 30 Mc/s, including systems using the so-called tropospheric-scatter mode of propagation.

STUDY GROUP X (*Broadcasting*)

To study the technical aspects of transmission and reception in the sound broadcasting service (except for tropical broadcasting), including standards of sound recording and reproduction to facilitate the international exchange of programmes.

STUDY GROUP XI (*Television*)

Television.

STUDY GROUP XII (*Tropical broadcasting*)

To study standards required for good quality service in the tropical zone, and for tropical broadcasting systems ; interference in the shared bands ; power requirements for acceptable service ; design of suitable aerials for short distance tropical broadcasting ; optimum conditions for utilization of frequency bands used for broadcasting in the tropical zone.

STUDY GROUP XIII (*Mobile services*)

To study technical questions concerning the air, sea and land mobile services, the radiolocation service and navigation service ; and miscellaneous operating questions of concern to several services.

STUDY GROUP XIV (*Vocabulary*)

To study in collaboration with the other Study Groups and, if necessary, with the CCITT, the radio aspect of the following :

Vocabulary of terms and list of definitions, lists of letter and graphical symbols and other means of expression, systematic classification, measurement units, etc.

A Resolution was adopted in connection with the preliminary documentation of Plenary Assemblies which had totalled some 500 documents, or 35.000 pages, before the opening of the Warsaw session, to the effect :

1. That documents submitted to the Chairmen of the Study Groups should be as short as possible, and only in exceptional circumstances should be longer than 2500 *words*, with approximately 3 *pages of figures*, making in all 8 *pages per document*.

2. That documents of theoretical interest only, which do not have a direct bearing on Questions and Study Programmes, or reports containing detailed original material, should not be submitted to the C.C.I.R. Short abstracts only of such documents should be sent to the C.C.I.R. for translation and publication. Copies of these documents, in their original language, could be distributed by the Administration concerned directly to those who express their desire to receive copies.

3. That documents should contain only the minimum indispensable mathematical formulae or numerical and experimental data.

4. That the Director should issue reminders to Administrations to refrain from asking for more copies of documents than are really necessary.

International Geophysical Year (I.G.Y.)

The new Director, consulted as to how the C.C.I.R. could best cooperate in the above, proposed that the Assembly confirm the choice of Prof. van der Pol as member of the Special Committee for the International Geophysical Year. The suggestion was adopted by acclamation.

INTERNATIONAL GEOPHYSICAL YEAR

A.G.I. News

Information on Organisation and Publications of the C.S.A.G.I.

The General Secretary has recently issued Circular letters giving information on matters which are summarised as follows :

The adoption by the Bureau of I.C.S.U. of Regulations for the Central Organisation for the International Geophysical Year.

The appointment by the Bureau of I.C.S.U. of Professors V. V. Belousov and J. Coulomb as additional members of C.S.A.G.I. Bureau, subject to confirmation by the Executive Board of I.C.S.U.

PUBLICATIONS

The appointment by the C.S.A.G.I. Bureau of an Advisory Committee on Publications : Dr. D. C. Martin (Chairman), Prof. G. Laclavère, Dr. W. W. Atwood, Prof. V. V. Belousov, Father J. O. Cardus and the General Secretary (Dr. M. Nicolet).

The decision to publish a journal « Annals of the International Geophysical Year » and to invite C.S.A.G.I. Reporters to become members of the Editorial Advisory Board of the Annals.

The use of the Annals for publishing all material of the IGY e. g. Vol. I Historical description of the First and Second Polar Years, followed by a general presentation of the IGY program. Vol. II the official documents of C.S.A.G.I. to date. Vol. III Chapters from Ionospheric and Auroral manuals and so on.

The publication of the Annals of the IGY by Pergamon Press, who are to establish direct contact with National Committees. There will be arrangements for off-printing parts of a volume.

The provision of texts in French or English to the General Secretary who will pass them on to the General Editor for printing.

Establishment of U.S. Ionospheric Stations

The Secretary, U. S. National Committee contributes :

« Two U. S. IGY ionospheric vertical incidence sounding stations, established by the Radio Propagation Agency of the Signal Corps as part of the U. S. program in ionospheric physics, were in operation as of January, 1957. They are located at St. Johns, Newfoundland and Thule, Greenland.

« A third vertical incidence sounding station, set up by the same agency, will be in operation on Bahama Island by April 1957.»

Progress in Antarctica 1956-1957

The following information on the progress of the plans for the IGY in Antarctica has been supplied by the IGY National Committees or the Adjoint Secretary. As will be seen, some use has been made of latest Press reports.

FRANCE : Reports dated 25 January, 19 February 1957.

Dumont d'Urville (60°40' S, 140°01' E), the main base has been established with a wintering party of 20 men.

Charcot (69°23' S, 139°02' E), the secondary base was established on 30 January, with a wintering party of 3 men.

The installation of scientific equipment as planned was proceeding at the two stations. Good radio communications have been worked with McMurdo, Mawson, Mirny, Noumea and Paris. There has been no communication with Little America V.

GREAT BRITAIN : Report dated 18 January 1957.

The party of 21 led by Colonel R. Smart, which will occupy the Royal Society base at *Halley Bay* (75°31' S, 26°36' W) until the end of the IGY, has arrived there in the steamship *Magga Dan*. The advance party of whom they relieved, left in the *Magga Dan* on 12 January, having established and wintered at the base.

The following established British bases participating in the IGY will be manned by the persons listed during the coming winter :

Port Stanley	10 (meteorological and ionospheric only)
South Georgia	5 (meteorological and glaciological only)
Admiralty Bay	8
Port Lockroy	6 (ionospheric only)
Hope Bay	13
Horseshoe Island	10
Duse Bay	manned by 2 members of the Hope Bay base.
Loubet Coast	10
Deception Island	6
Signy Island	8

A long wave and a sea level recorder have been installed at the Argentine Islands. Radio sonde ascents are made at Port Stanley and the Argentine Islands.

JAPAN : Reports dated 5 and 15 February 1957. Also Adjoint Secretary's 1 February 1957.

Hongul (Ongul) Island (69°02' S, 39°36' E) is in Lützow Holm Bay and 3.5 Km from the Antarctic mainland. The wintering party will be 11 men.

The Japanese base will be known as « Showa Base » and it will include Hongul Island itself, surrounding islets and an area of the nearest coast of the mainland. A subsidiary base may be established further south.

The use of the scientific equipment as planned by 1 July 1957 depended on the progress with the landing and installation, but the last message reported the main base as being established.

NEW ZEALAND Reports dated 25 January and 6 February 1957.

Scott Base (77°51' S, 166°45' E, U.S.H.O. Charts 6666 and 6667) is now practically completed. It is sited at Pram Point on the east side of McMurdo Sound and about 2 miles from Hut Point.

Adare Station (72°25' S 170°55' E) established by the U. S. Navy at Cape Hallett is a joint United States/New Zealand enterprise. The 3 New Zealand scientists located there will be responsible for all the scientific work, excluding the meteorological program, which will be operated entirely by the United States.

U. S. A. : Reports dated 18 January, 8 and 19 February 1957.
Also Adjoint Secretary's 25 January 1957.

The location of the U. S. IGY Antarctic stations is as follows :

Station	Lat.	Long.
I.G.Y. Little America Station	78°16' S	162°28' W
I.G.Y. Byrd Station	80° S	120° W
I.G.Y. Amundsen-Scott South Pole Station	90° S	
Williams Naval Air Facility at McMurdo Sound	77°50' S	166°36' E
I.G.Y. Adare Station	72°25' S	170°55' E
I.G.Y. Ellsworth Station	77°43' S	41°07' W

The establishment of the following additional U. S. IGY Antarctic Station is expected shortly :

Station	Lat.	Long.
A.G.I. Wilkes Station in the vicinity of ..	67° S	110° E

Western Pacific Regional Conference

Preliminary Report.

1. This conference was held in Tokyo from 25 February to 2 March with the approval of the C.S.A.G.I. Bureau. Arrangements were made by the Science Council of Japan whose President, Professor Kaya, welcomed the delegates, and by an organising committee whose Chairman, Professor Hasegawa, was elected President of the Conference at the opening session. Professor Hatanaka was appointed Secretary of the Conference and was assisted by Dr. Fukushima.

2. There were 35 delegates representing National Committees of Australia, Chinese Peoples' Republic, Indonesia, Pakistan, Philippines, U. S. A. and U. S. S. R. Professor Belousov represented the C.S.A.G.I. Bureau and the Coordinator also attended.

Unesco and New Zealand sent an observer. The Japanese Organising Committee of 20 was arranged to cover all disciplines, except Glaciology, and a convener in each had prepared a draft agenda which expedited the work of each working group.

3. The Conference took the customary form. Working groups were formed and concluded their work with recommendations and resolutions. An Executive Committee of the President, Secretary, Chairmen of Working Groups, Leaders of delegations, Professor Belousov and the Coordinator met daily to watch progress and to agree Resolutions before their presentation to the Final Plenary Session for approval.

There were about 50 Recommendations and Resolutions, mainly concerned with improving arrangements of stations and observations within the Region, but several had a wider application and were addressed to C.S.A.G.I. for consideration by the Reporter in the appropriate discipline.

4. Receptions were held by the President of the Science Council of Japan and the Minister of Education. There was a tour of Tokyo and opportunities to visit scientific institutions. The concluding Resolutions at the final session showed the great appreciation by the delegates of these and many other occasions of hospitality which provided welcome opportunities for informal personal contacts and discussions.

World Days and Communications

WW Series Circular Letters

Subsequent to the information in Item 14 the following circular letters in the WW series have been issued on the dates stated :

WW-5 17 December 1956 Outline and elaboration of the plans adopted by resolution at the C.S.A.G.I. Barcelona (1956) Conference for trial weeks to test IGY communications.

WW-6 1 February 1957 Preliminary report on January Trial Week.

WW-7 11 March 1957 First Report on February Trial Week.

WW-6 also carried a reference number in the RWC, WH and US series of circular letters which are issued by the C.S.A.G.I. Reporter for World Days and Communications to :

RWC Series. — IGY Regional Warning Centres.

WH Series. — Western Hemisphere National Warning Contacts.

US Series. — Selected U. S., IGY Stations.

WW-7 embodies the text previously issued in RWC-14, WH-5 and US-7, with an addendum giving times of receipt of test warning messages in the Western European and Eurasian Regions. Since the recipients of the WH and US series are not directly interested in the addendum, they have been omitted from the addressees of WW-7.

« Preliminary Reports » on the results of the trial weeks have been circulated by the Western Pacific Regional Warning Centre to the C.S.A.G.I. Reporter, other Regional Warning Centres and to Western Pacific Region National Warning Contacts in a « WPWDC » series.

**Joint C.S.A.G.I./C.S.A. Meeting
of coordination for the I.G.Y. in Africa,
South of the Sahara**

Bukavu (Belgian Congo), 11th-15th February, 1957

The following topics related with the ionosphere were on the Agenda.

- (i) Gaps in the distribution of existing stations : Southern Angola, Federation of Rhodesia and Nyasaland, Mozambic.
- (ii) Nairobi, East Africa.
- (iii) Dakar, French West Africa.
- (iv) Echange of information between centres doing ionospheric physics.

The following recommendations of interest to the activities of U.R.S.I./A.G.I. Committee were drafted during the meeting.

1. — MAGNETIC AND IONOSPHERIC STATIONS IN SALISBURY

The Joint C.S.A.G.I./C.S.A. Meeting of Coordination for the International Geophysical Year in Africa South of the Sahara

Considers that because of the favourable geographical position of Salisbury -20° S of the geomagnetic equatorail possible assistance should be given to the National Committee of the Federation of Rhodesia and Nyasaland to establish magnetic and ionospheric stations there and *recommends* that National Committees, which have at their disposal instruments that are not in use, should offer to lend them to the Federation.

2. — IONOSPHERIC STATION AT DAKAR

The Joint C.S.A.G.I./C.S.A. Meeting of Coordination for the International Geophysical Year in Africa South of the Sahara :

Noting with regret that the research at the Ionospheric observing station at Dakar — Cape Manuel — might be interrupted during the IGY as the station is to be moved from Cape Manuel to Camberene,

Considering the position of Dakar in the African ionospheric network and the importance of the research programme planned for the IGY, *draws the attention* of the French National Committee to the need for ensuring the continuity of this work.

3. — LATITUDES AND LONGITUDES

(a) Time Signals

The Joint C.S.A.G.I./C.S.A. Meeting of Coordination for the International Geophysical Year in Africa South of the Sahara :

Notes the serious difficulties experienced in Africa in receiving the time signals sent by the National Bureau of Standards of the United States of America operating WWV and WWVH and by the Observatory of Tokyo because the transmissions are made on the same frequencies,

Notes further the fundamental importance of receiving these signals for certain programmes of the IGY,

Requests the National Committees of the IGY in Africa South of the Sahara to draw the attention of the appropriate authorities in their own countries to these difficulties and to *invite* them to

study the matter with the view to making proposals to C.C.I.R. (Consultative Committee of International Radiotelecommunications).

(b) *Artificial Satellite*

The Joint C.S.A.G.I./C.S.A. Meeting of Coordination for the International Geophysical Year in Africa South of the Sahara,

Noting that the Union Observatory in Johannesburg is responsible for supplying accurate time to the stations of the Union of South Africa from which the observations of the artificial satellite will be made and *noting* further that the Union Observatory is one of the organizations that will be expected to take an active part in the radio propagation studies during the IGY *recommends strongly* to the South African National Committee of the IGY that steps be taken to insure more powerful transmitters at the Union Observatory.

4. — CONTINUED CO-OPERATION

1. The Joint C.S.A.G.I./C.S.A. Meeting of Coordination for the International Geophysical Year in Africa South of the Sahara :

Noting the need for continued co-operation in the Geophysical sciences throughout the Geophysical Year, and *noting* further the useful role played by C.S.A. during the period of preparation for the IGY, *requests* the IGY National Committees in Africa South of the Sahara :

- (a) to submit their complete programmes and subsequently any revision — which in any case should be sent direct to C.S.A.G.I. — to C.S.A. also, for circulation in Africa South of the Sahara,
- (b) to encourage workers in the different disciplines to maintain contact by informal correspondence with their colleagues in other territories in Africa South of the Sahara.

2. The Joint C.S.A.G.I./C.S.A. Meeting of Coordination for the International Geophysical Year in Africa South of the Sahara :

Notes the benefit derived by all concerned from the collaboration initiated during the course of the Meeting and *notes* further the importance of planning systematic studies of some geophysical problems in Africa based on the data collected during the IGY *invites* C.S.A. to consider the possibility of convening a second meeting of experts in geophysical sciences in the course of 1958.

INTERNATIONAL CONFERENCES

Unesco : International Conference on Radio-Isotopes in Scientific Research

Paris, 9-20 September 1957

General Information

An International Conference on Radio-isotopes in Scientific Research will be held in Paris from 9 to 20 September 1957. This Conference is being convened by Unesco, after consultation with the United Nations Secretariat and interested Specialized Agencies, in particular the World Health Organization, the United Nations Food and Agriculture Organization and the World Meteorological Organization.

The Conference will be strictly scientific in character. Its purpose is to bring together a large number of specialists in the various scientific disciplines interested in the use of radio-isotopes, so that they may communicate to each other the results of their research and exchange information and views on a series of subjects in which particularly rapid developments are occurring. The Conference will therefore be devoted to the presentation and discussion of scientific papers dealing with original research. It will not be qualified to adopt resolutions or to make recommendations.

The programme and organization of the Conference were settled with a group of consultants who met in Unesco House on 14 and 15 January 1957. The group consisted of the following : C. D. Coryell (United States of America), Ch. Fisher (France), F. M. Gomes (Brazil), T. Hamada (Japan), C. Jech (Czechoslovakia), A. S. Rao (India), I. D. Rojansky (Union of Soviet Socialist Republics), H. Seligman (United Kingdom) and V. S. Vavilov (Union of Soviet Socialist Republics), as well as representatives of the following organizations : the United Nations Food and

Agriculture Organization (R. A. Silow), the World Health Organization (I. S. Eve), the World Meteorological Organization (P. J. Meade), and the European Organization for Nuclear Research (A. Lundby).

I. — SCIENTIFIC PROGRAMME

Although the expression « radio-elements » is more correct, it was decided to retain in the title of the Conference the term « radio-isotopes », as being more widely used. The Conference will be primarily devoted to the exposition and discussion of new ideas or methods for the *utilization* of radio-isotopes in scientific research. Nevertheless, new ideas concerning the production of radio-isotopes (for example, the constitution of intense sources or the production of isotopes which have hitherto been difficult to obtain) may be discussed. Similarly, recent progress in measurement techniques designed to facilitate the use of radio-isotopes will be dealt with. Problems relating to the use of stable isotopes will be discussed only when they are presented in comparison with a similar use of radio-isotopes. In the same way, radiations produced by machines (particle accelerators, etc.) will only be discussed by analogy.

Papers relating to measurement methods and to the production of radio-isotopes will be read and discussed in plenary session. Other papers will be grouped into two main sections, one concerning the physical sciences and the other the biological sciences. Each of these two sections will be divided into sub-sections, as indicated in the table below.

In view of the purpose of the Conference, only scientific papers resulting from original research can be accepted. Neither the use of radio-isotopes for purely technical or economic purposes, nor their application in diagnosis or in medical treatment, come within the purview of the Conference ; this applies also to research in the field of genetics, where artificial sources of radiation are more usually employed. Finally, so far as the engineering sciences are concerned, discussion will be limited to new research methods in which isotopes are used, to the exclusion of those technological applications which are already known.

Plenary meetings.

1. New developments in measurement techniques (including autoradiography and low-level counting).
2. Significant developments in the production of radio-isotopes (including intense sources isotopes difficult to obtain, etc)..

Section 1.

Radio-isotopes in the physical sciences.

1. Use of radio-isotopes in solid state physics.
2. Use of radio-isotopes in other physical research.
3. Use of radio-isotopes in physical chemistry research.
4. Use of radio-isotopes in analytical chemistry research.
5. Use of radio-isotopes in organic chemistry research.
6. Use of radio-isotopes in geophysical, geological, and archeological research (including meteorology and oceanography).
7. Use of radio-isotopes in metallurgical research.
8. Use of radio-isotopes in engineering research methods.

Section 2.

Radio-isotopes in the biological sciences.

1. Use of radio-isotopes in biochemical research (including plant biochemistry and photosynthesis).
2. Use of radio-isotopes in animal and human physiological research.
3. Use of radio-isotopes in animal and human nutrition research.
4. Use of radio-isotopes in basic medical and pharmaceutical research.
5. Use of radio-isotopes in plant physiology research.
6. Use of radio-isotopes in agricultural research (including plant nutrition and soil fertility, and insecticide and fungicide research).
7. Use of radio-isotopes in zoological and ecological research (including entomology and marine and fresh-water biology).

II. — PARTICIPANTS

Participation in the Conference will be limited to the following categories of persons :

(a) Participants nominated by the governments of Member States and Associate Members of Unesco, or by any other State which the Executive Board of Unesco decides to invite.

(b) Persons participating in their individual capacity or sent by scientific or industrial bodies, provided that they are approved by the States of which they are nationals.

Requests to participate under category (b) can be sent to Unesco either direct or through such national authorities as the States mentioned above may designate for this purpose. Every effort will be made to accede to these requests, subject to the scientific merit of the applicants and the need to keep the total number of participants within reasonable limits in the light of available space.

(c) Representatives of the United Nations and its Specialized Agencies.

(d) Representatives of international scientific organizations.

Participants wishing to present papers should submit to Unesco *before 1 May 1957* the title, as well as a summary (250 words in length), of any paper proposed and, *before 1 July 1957*, the complete text of that paper. The working languages of the Conference will be English and French. The proceedings of the Conference will be published.

Supplementary information can be obtained either from Unesco — Radio-isotopes Conference — 19, Avenue Kléber, Paris 16^e, France, or from the competent national authorities in each country.

International Conference on Scientific Information

Washington, November 1958.

An International Conference on Scientific Information is to be held in Washington, D. C., U. S. A., in November 1958. This Conference being sponsored by the National Academy of Sciences.

National Research Council of the U. S. A., the National Foundation and the American Documentation Institute.

A preliminary planning committee considered the areas which should be critically examined and discussed, and their ideas were substantially approved by a reviewing conference of scientists and documentalists called last November by the National Academy of Sciences — National Research Council. The area of the agenda and a general statement regarding the conference plans have been set out.

Within this framework the Conference Committee invites contributions to the Conference program from workers anywhere in the world who are interested in presenting papers in any of the areas covered by the agenda of the Conference.

Workers wishing to submit papers or to attend the conference should ask for further informations to Dr. Alberto F. Thomson, Executive Secretary, I. C. S. I., National Academy of Sciences, 2101, Constitution Avenue, Washington, 25 D. C., U. S. A.

International Colloquium on Physical Problems of Colour Television

1. Under the sponsorship of the International Union of Pure and Applied Physics, a Colloquium on Physical Problems of Colour Television will be organized in Paris from July 2 to 6, 1957. The working sessions will be held at the Conservatoire National des Arts et Métiers, 292, rue Saint-Martin à Paris.

2. The following French Scientific Societies :

Société Française de Physique,

Société des Radioélectriciens,

Société Française des Ingénieurs et Techniciens du Vide.

have also given their sponsorship and have appointed a Committee to organize the Colloquium.

3. *Tentative Programme.* — During the Plenary Assembly of C.C.I.R. held in Warsaw August-September 1956, Study Group XI (on Television) recommended investigation on quantitative methods and results relevant to the estimation of the qualities of Television

images and approved the appointment of a working group on such matters. Physicists, Electronicians and Opticians, Television specialists will certainly welcome the opportunity given by this Colloquium to meet to exchange and compare opinions and informations concerning the various problems met in the study of the Colour Television and in the designing of equipment. Among such topics the following may be mentioned :

- A. The behaviour of the eyes.
- B. Taking of views and image reproduction.
- C. Measurement of results obtained in the reproduction of a coloured picture.
- D. Coding systems used for the transmission of Colour Television signals.

Further information are available by request to : Monsieur le Secrétaire du Colloque International sur la Télévision en Couleurs, Conservatoire National des Arts et Métiers, 292, rue Saint-Martin, Paris III, France.

BIBLIOGRAPHY

Ionospheric Stations

Bulletin de la Station Ionosphérique de Lwiro (Belgian Congo) de l'Institut pour la Recherche Scientifique en Afrique Centrale. Vol. I : February 1952-July 1953, issued by the Institut Royal Météorologique de Belgique.

Ionospheric Data from Nurmijärvi, General Direction of Posts and Telegraphs, Helsinki, Finland.

International Telecommunication Union. List of Aeronautical and Aircraft Stations. The List of Aeronautical and Aircraft Stations is a reference document published by the International Telecommunication Union in accordance with the Radio Regulations annexed to the International Telecommunication Convention. It has two main parts :

1. Particulars of aeronautical stations classified by country. The information given includes the name of the station, the call sign, the transmission and reception frequencies used for communication with aircraft, the classes of emission and the power used, the kind of service offered, operating hours, the charges made for the exchange of radiotelegrams, the geographical position, the operating agency, and other details of practical utility. A sub-section gives information about ocean weather stations.

2. Particulars of the stations of aircraft carrying out international flights, arranged in alphabetical order of call signs independently of nationality. The information given includes the name or national registration markings, the frequencies used, the kind of services offered, the charges levied for the exchange of radiotelegrams, the name and address of the operating agency, the type of aircraft manufacturers' name.

An annex at the end shows the inland telegraph rates, and the rates for telegrams between adjacent countries, levied for the routing of radiotelegrams to the country in which the aeronautical station is and to adjacent countries.

The List of Aeronautical and Aircraft Stations, 25th edition, is published in three languages (English, Spanish and French) in a single volume. The price (inclusive of carriage) is 12 *Swiss francs* per copy. I. T. U. General Secretariat, Palais Wilson, 52, rue des Pâques, Geneva, Switzerland.

International Electrotechnical Commission

The Second Supplement to I.E.C. Publication 67, « Dimensions of Electronic Tubes and Valves » has now been published by the International Electrotechnical Commission.

This publication is in loose leaf form and the following Standard Sheets are included in the Second Supplement for insertion into the loose leaf folder :

Bases :

- Subminiature base E8-9.
- Gauge for subminiature base E8-9.
- Subminiature base E8-10.
- Super Jumbo 4-pin base.
- Super Jumbo 4-pin base gauge.
- Subminiature base B5B/F.

Outlines :

- Tube and valve outlines used with B8A base.
- Inline lead T2 × 2 subminiature outlines.
- Lead spacing gauge GE7-3.
- Inline lead T3 subminiature outline.
- T3 subminiature tube outlines used with subminiature base E8-9.
- T3 subminiature tube outlines used with subminiature base E8-10.
- Tube and valve outline used with B5B/F base.

Caps :

- Cylindrical caps.
- Cavity cap.
- Recessed ball cap.

This publication is on sale at the Central Office of the I.E.C., 1, rue de Varembe, Geneva, Switzerland, at the price of Sw. Fr. 8, per copy, plus postage.

- N° 50 (30). — Second edition of the International Electrotechnical Vocabulary. Group 30 : Electric traction.
- N° 83. — First edition. Standards for plugs and sockets-outlets for domestic and similar general use.
- N° 79. — First edition. Recommendations for the construction of flameproof enclosures of electrical apparatus.

These publications are on sale at the Central Office of the I.E.C., at the prices respectively of Sw. Fr. 9,6 and 7,50 per copy, plus postage.
