Bulletin N° 110 July-August 1958

International Scientific Radio Union

U. R. S. I.

CONTENTS

URSI NEWS

We have the pleasure to inform our readers that Dr. W. J. G. BEYNON, Secretary of Commission III, U.R.S.I./A.G.I. Committee and Mixed Commission on Ionosphere has been offered the chair of Physics in the College of Aberystwyth, Wales.

As from 1st October next, his address will be : Prof. W. J. G. BEYNON, Department of Physics, University of Wales, Aberystwyth, Wales, U. K.

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Prof. A. C. B. LOVELL and Dr. R. COUTREZ, respectively Chairman and Secretary of Commission V, will represent U.R.S.I. at the General Assembly of the International Astronomical Union (Moscow, August 1958).

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Dr. J. H. DELLINGER, Honorary President of U.R.S.I. and Dr. J. P. HAGEN, Vice-Chairman of the U. S. A. National Committee, will represent U.R.S.I. at the International Conference on Scientific Information (Washington, November 1958).

INFORMATIVE PAPERS

International Electrotechnical Commission
I. E. C.

Object and Members

The object of the Commission is to facilitate the co-ordination and unification of national electrotechnical standards and to co-ordinate the activities of other international organizations in this field.

Any self-governing country desiring to participate in the work of the Commission may form a committee for its own country and apply for membership of the Commission. This committee when it has been accepted as a member is known as the « National Committee ».

The National Committees of the I. E. C. are composed of representatives of the various technical and scientific organizations which deal with questions of electrical standardization on the national level. Most of them are recognized and supported by their respective governments.

There is only one Committee for each country. At the present time thirty three countries are members of the Commission.

Organization

To attain its object the I.E.C. publishes recommendations which, as far as possible, express international agreement upon the subjects dealt with. Although I.E.C. Recommendations are not binding upon the member organizations, these latter are strongly recommended to follow them when drawing up their national specifications, so as to unify all national specifications and to facilitate commerce.

The work of the I.E.C. is carried on by a Council, a Committee of Action, a Central Office and Technical Committees.

(*a*) *Council.* — The administration of the I.E.C. is carried out by a Council composed of the President of the I.E.C., Presidents of National Committees, the Treasurer and the Secretary.

(*b*) *Committee of Action.* — The Committee of Action is elected by the Council. It is composed of the President of the Commission and 9 Vice-Presidents or their duly accredited deputies. The past-President, the Treasurer and the Secretary are members ex officio.

The Committee of Action has authority to deal with all administrative questions in the interval between the meetings of the Council. It takes all decisions which it considers necessary to facilitate the technical work of the Commission.

(*c*) *Central Office.* — The Central Office is the permanent office which sees to the execution of the decisions of the Council and which carries on the work of Secretariat of the I.E.C. : reproduction and circulation of documents, organization of meetings, accountancy, etc.

(*d*) *Technical Committees.* — The technical work of the Commission is carried out by Technical Committees, each dealing with a given subject (see appendix). These are set up by the Council, or by the Committee of Action.

I.E.C. Recommendations

The texts which have been approved by the appropriate Technical Committees and ratified by at least four-fifths of the National Committees are published as Recommendations. A list of these recommendations can be obtained from the Central Office of the I.E.C., on request.

Activities

The work of the I.E.C. covers almost all spheres of electrotechnology, including both power and light current fields. It can be divided into two categories :

1. Work aiming at improving understanding between electrical engineers of all countries by drawing up common means of expression : unification of nomenclature ; agreement on quantities and units, their symbols and abbreviations ; standardization of systems of units ; graphical symbols for diagrams.

2. Standardization of electrical equipment proper, involving the study of problems of the electrical properties of materials used in electrical equipment, standardization of guarantees to be given for a certain equipment as to the characteristics, methods of test, quality, safety, and dimensions controlling interchangeability of machines and electrical equipement.

History

During international electrical congresses held at the end of the last century, it was agreed that a permanent organization capable of carrying out electrotechnical standardization in a methodical and continuous manner was necessary. Colonel R. E. Crompton (United Kingdom) was entrusted by the St.-Louis Congress, in 1904, with the organization of such a body.

During the first meeting held in London in 1907, the constitution of the International Electrotechnical Commission was discussed and provisional statutes were drawn up.

Fourteen National Committees having been officially formed, the Council of the I.E.C. met for the first time in London in 1908 and approved the first statutes of the Commission, which remained almost unchanged until 1949.

In 1947 the International Electrotechnical Commission became affiliated with the International Organization for Standardization (ISO) as its electrical division, whilst preserving its technical and financial autonomy. In this capacity, the Commission has at present consultative status with the Economic and Social Council of the United Nations.

I.E.C. Relations

The I.E.C. maintains a liaison with those international organizations which deal directly or indirectly with electrotechnology, for the solution of problems of common interest.

Amongst these organizations are the following :

International Bureau of Weights and Measures,
Comité International Radio-Maritime,
European Broadcasting Union,
International Federation of Documentation,

International Labour Office,
International Organization for Standardization,
International Telecommunication Union,
International Radio Consultative Committee,
International Telegraph and Telephone Consultative Committee,
International Broadcasting Organization,
International Union of Pure and Applied Physics,
Unesco,
U.R.S.I., etc.

* * *

The address of the Central Office of the I.E.C. is as follows : 1, rue de Varembé, Geneva (Switzerland).

Appendix

Abstract of the list of I.E.C. Technical Committees and Sub-Committees :

N°	Title	Chairman	Secretariat
1	Nomenclature	General E. E. WIENER (Belgium)	France
3	Graphical Symbols	Mr. A. LANGE (France)	Switzerland
8	Standard Voltages, Current Ratings and Frequencies	Mr. H. PUPPIKOFER (Switzerland)	Italy
12	Radio-communication	Mr. P. BESSON (France)	Netherlands
12-1	Measurements	Mr. S. A. C. PEDERSEN (Denmark)	Netherlands
12-6	Radio Transmitters	M. C. BEURTHERET (France)	Netherlands
13	Measuring instruments	Mr. I. BÖHM (Hungary)	Hungary
13C	Electronic Measuring Instruments	Mr. I. BÖHM (Hungary)	U.S.S.R.
24	Electric and Magnetic Magnitudes and Units		France
25	Letter Symbols and Signs	Mr. R. LANGLOIS-BERTHELOT (France)	France

N°	Title	Chairman	Secretariat
39	Electronic Tubes and Valves and similar semi-conducting devices	Mr. T. E. GOLDUP (United Kingdom)	Netherlands
39-1	Electronic Tubes and Valves	Mr. T. E. GOLDUP (United Kingdom)	Netherlands
39-2	Semi-conductor Devices	Mr. V. M. GRAHAM (U.S.A.)	France
39-4	Sockets and Accessories for Electronic Tubes and Valves	Mr. F. DUMAT (France)	Netherlands
40	Components for electronic equipment	Mr. E. F. SEAMAN (U.S.A.)	Netherlands
40-1	Capacitors and Resistors	Dr. G. P. REYNOLDS (United Kingdom)	Netherlands
40-3	Piezo-electric Crystals	Mr. W. J. YOUNG (United Kingdom)	Netherlands
40-6	Parts made of Ferro-magnetic Oxides	Dr. K. H. VON KLITZING (Germany)	Netherlands
	International Special Committee on Radio Interference (C.I.S.P.R.)	Mr. O. W. HUMPHREYS (United Kingdom)	United Kingdom

XIIth GENERAL ASSEMBLY

Papers submitted to the General Assembly

Copies of papers mentioned in the following lists are available at the General Secretariat at the price mentioned in the last column (postage included) (1 B. F. = $ 0,02 = 1 3/4 pence).

(*) Documents circulated in full text.

(**) Documents for which a summary is circulated.

List of documents submitted to Commission I

N°	Titles and Authors	F.B.	£	$
255*	Report of the U.S.A. Comm. I, U.R.S.I. A fade-cancelling zero beat indicator, R. J. BLUME.	8	0.1.4	0.16
256*	U.S.A. Comm. I, U.R.S.I. Low frequency standards transmissions, W. D. GEORGE.	16	0.2.8	0.32
257*	U.S.A. Comm. I, U.R.S.I. NBS Boulder Lab. Accuracy of WWV and WWVH, W. C. STICKLER.	6	0.1.0	0.12
258*	NBS Boulder Lab. Status report on micro-calorimetric technique, G. F. ENGEN.	10	0.1.8	0.10

List of documents submitted to Commission II

N°	Titles and Authors	F.B.	£	$
16*	Theory of tropospheric propagation near and beyond the radio horizon, O. TUKIZI, Electrical Communication Laboratory, Musasinosi, Tokyo, Japan.	6	0.1.0	0.12

N°	Titles and Authors	F.B.	£	$
17**	Multi-path transmission through the troposphere, T. OMORI, The Electrotechnical Communication Laboratory, Nippon Telegraph and Telephone Corporation.	1	0.0.2	0.02
18*	Ray Theoretical analysis of fading due to duct, F. IKEGAMI, *Ibid.*	6	0.1.0	0.52
19**	Multiple diffraction of electro-magnetic waves by spherical mountains, K. FURUTSU, Radio Research Laboratories, Kokubunji, Tokyo (*Journ. Radio Res. Lab.*, Vol. 3, n° 14, Oct. 1956).	1	0.0.2	0.08
20*	On the relationship between scattering of radio waves and the statistical theory of turbulence, K. TAO, Radio Research Laboratories	6	0.1.0	0.12
21**	Characteristics of radio waves diffracted by a mountain, T. KOONO, Y. KURIHARA, M. FUKUSHIMA, *Ibid.*	1	0.0.2	0.02
22*	A new type refractive index variometer, K. HIRAO, *Ibid.*	8	0.1.4	0.16
29*	Wave propagation over irregular terrain, K. FURUTSU, Radio Research Laboratories, Kokubunji.	5	0.0.10	0.10
81*	Quasi-Rayleigh fading in tropospheric propagation, Ingenieur P. BECKMANN.	3	0.0.6	0.06
84*	Inhomogeneous path and general features of ground wave propagation, E. L. FEINBERG, P. N. LEBEDEV, Physical Institute, U.S.S.R. Academy of Science.	10	0.1.8	0.20
85*	Fluctuations d'une onde diffusée par des inhomogénéités dont les vitesses sont des fonctions aléatoires stationnaires du temps, G. GORÉLIK, M. RODAK, A. FRANTZESSON.	10	0.1.8	0.20
86*	Theory of wave propagation in the turbulent atmosphere (Review of work carried out in U.S.S.R.), V. A. KRASSILNIKOV, Faculty of Physics, Lomonosov State University, Moscow.	9	0.1.6	0.18

N°	Titles and Authors	F.B.	£	$
87*	On the scattering theory of electromagnetic waves in the medium with random irregularities of the refractive index, V. A. KRASSILINIKOV, V. V. MERKULOV, *Ibid.*	7	0.1.2	0.14
105*	Comparison of Millington's method and the equivalent numerical distance method with theory, Z. GODZINSKI, Research Centre of the Institute of Telecommunications, Wroclav, Poland.	9	0.1.6	0.18
111*	Comparison of measured and compute refractive bending in the troposphere, L. J. ANDERSON, L. G. TROLESE, J. B. SMYTH, Smyth Research Associates, San Diego, California.	8	0.1.4	0.16
112*	Foreground terrain effects on overland microwave transmissions, L. G. TROLESE *Ibid.*	9	0.1.6	0.18
114*	Report on the work of C.C.I.R. Study Group V at the VIIIth, Plenary Assembly in Warsaw, 1956, R. L. SMITH-ROSE, Chairman.	2	0.0.4	0.04
117*	Some remarks about scattering-experiments in the 100 Mc/s-band, Dr. J. GROSSKOPF.	10	0.1.8	0.20
120*	Some results of propagation tests at 1000 Mc/s and 4000 Mc/s on two optical paths of different lengths, F. CARASSA, B. PERONI.	4	0.0.8	0.08
152*	Some experimental investigations of long range VHF and UHF tropospheric propagation, J. A. SAXTON, G. W. LUSCOMBE, Radio Research Station, D.S.I.R., Slough, England.	3	0.0.6	0.06
153*	Some features of VHF and UHF groundwave propagation, J. A. SAXTON, B. N. HARDEN, *Ibid.*	11	0.0.4	0.04
155*	Report on Radio Wave Propagation within the Horizon.	11	0.1.10	0.22
174*	The influence of moisture in the ground, temperature and terrain on ground wave propagation in the VHF-band, B. JOSEPHSON, A. BLOMQUIST, Research			

N°	Titles and Authors	F.B.	£	$
	Institute of National Defence, Sweden.	12	0.2	0.24
175*	Some microwave propagation experiences from a « just-below-horizon » path, B. JOSEPHSON, F. EKLUND, *Ibid.*	10	0.1.8	0.20
176*	Distance dependence, fading characteristics and pulse distortion of 3000 Mc/s trans-horizon signals, B. JOSEPHSON, G. CARLSON.	12	0.2.0	0.24
232*	Some results of tropospheric scatter propagation measurements in Poland, S. MANCZARSKI, J. MOLSKI, L. KIERNOZYCKI.	7	0.1.2	0.14
243**	Meteorological studies of refractive index distribution, K. H. JEHN, V. E. MOYER, J. R. GERHARDT, N. K. WAGNER.	2	0.0.4	0.04
244**	Radiopropagation measurements at millimeter wavelengths, C. W. TOLBERT, A. W. STRAITON.	2	0.0.4	0.04
245**	The role of stratospheric scattering in radio communications, H. G. BOOKER, W. E. GORDON.	1	0.0.2	0.02
246**	On the total bending of radio waves, B. R. BEAN, B. A. CAHOON.	1	0.0.2	0.02
247**	On the prediction of VHF transmission loss, B. R. BEAN.	1	0.0.2	0.02
248**	Dependence of VHF-UHF radiotransmission loss on angular distance, P. L. RICE.	1	0.0.2	0.02
249**	Overwater scatter propagation in thunderstorms conditions, W. S. AMENT, F. C. MACDONALD, D. L. RINGWALT.	1	0.0.2	0.02
250**	Meter wavelength propagation at great distances and heights beyond the radio horizon, L. A. AMES, E. J. MARTIN, T. F. ROGERS.	1	0.0.2	0.02
268**	Observations of antenna-beam distortion in trans-horizon propagation, WATERMAN	1	0.0.2	0.02
269**	Some general scattering relationships in trans-horizon, WATERMAN.	1	0.0.2	0.02
270*	Radio studies of atmospheric turbulence of line-of-sight paths, J. HERBSTREIT, M. C. THOMPSON.	7	0.1.2	0.14

List of documents submitted to Commission III

N°	Titles and Authors	F.B.	£	$
23*	Dynamical structure of the ionospheric F2 layer as deduced from its daily variations T. SHIMAZAKI, Radio Research Laboratories, Kokubunji, Tokyo, Japan.	7	0.1.2	0.14
24*	On the occurrence of the Fl 1/2 at Tokyo, O. KASUYA, *Ibid.*	5	0.0.10	0.10
25*	Some results of a sweep-frequency propagation experiment over a North-South path at a distance of about 1000 km, Y. AONO, I. KURIKI, *Ibid.*	4	0.0.8	0.08
26*	Measure of magnitude of sudden ionospheric disturbance, Y. NAKATA, *Ibid.*	3	0.1.0	0.06
27*	On radio propagation disturbances, K. SINNO, Hiraiso Radio Wave Observatory, Radio Research Laboratory.	7	0.1.2	0.14
28*	Ionospheric F2 disturbances associated with geomagnetic storms, T. SATO, Geophysical Institute, Kyoto University, Japan.	7	0.1.2	0.14
29*	Wave propagation over irregular terrain.	5	0.0.10	0.10
30*	On sequential Es, S. MATSUSHITA, Geo-phy sical Institute, Kyoto University, Japan.	5	0.0.10	0.10
31*	Remarkable lateral deviation in the ionospheric propagation, K. MIYA, M. ISHIKAWA, S. KANAYA, Kokusai Denshin Denwa Co, Ltd., Japan.	9	0.1.6	0.18
32*	A new theory of formation of the F2 layer T. YONEZAWA, Radio Research Laboratory, Kokubunji, Tokyo.	9	0.1.6	0.18
33*	Magneto-hydrodynamic waves in the ionosphere, S. AKASOFU, Geophysical Institute, Tohoku, University, Sendai, Japan.	6	0.1.0	0.12
34*	Calculation of the propagation path of whistling atmospherics, K. MAEDA, I. KIMURA, Department of Electronic Engineering, Kyoto Univeristy.	8	0.1.4	0.16
35*	The difficulties in explaining the formation of the ionosphere, Y. INOUE, Technical Research Institute, National Defence Agency, Tokyo.	4	0.0.8	0.08

N°	Titles and Authors	F.B.	£	$
65**	Method of ionospheric production, E. CHVOJKOVA, Astronomical Institute, Ondrejov (*Publ. Astron. Czechosl.*, 26, 1955 ; *C.C.I.R.*, 1956, Doc. 219).	1	0.0.2	0.02
66**	A new possibility of long-distance propagation of metric waves, same author (*Bull. Astron. Czechosl.*, 5, 1954, 104-108, 110-111).	1	0.0.2	0.02
67**	Refraction of radiowaves in an ionised medium, same author (*Ibid.*, 5, 1954, 99-104- 104-108).	1	0.0.2	0.02
69**	Ionospheric layer during photoionisation. Theory of bifurcation and rocket research, same author (*Bull. Astr. Czechosl.*, 4, 1953 20, 101-109 ; 1956, 33-38 ; 1957.	1	0.0.2	0.0.2
70*	On the relation between the night E-layer above Lindau/Harz and the geomagnetic activity, A. HAJKOVA, J. MRAZEK.	6	0.1.0	0.12
71**	Measuring of the number of fadings, P. TRISKA.	1	0.0.2	0.02
72**	On the presence of a sporadic E-layer above Lindau/Harz during the period between 1948 and 1955, J. MRAZEK.	1	0.0.2	0.02
77*	L'ionisation nocturne de la région E et l'activité géomagnétique, A. HAUBERT.	1	0.0.2	0.02
78*	A propos des grands mouvements verticaux de la région F observés à Casablanca, A. HAUBERT.	1	0.0.2	0.02
79*	Les gradients de température dans la région E et Fl, d'après les sondages ionosphériques effectués à Casablanca, A. HAUBERT.	3	0.0.6	0.06
88**	On the theory of propagation of radiowaves in the ionosphere, V. L. GINZBURG, P. N. LEBEDEV, Institute of Physics, U.S.S.R., Academy of Sciences.	1	0.0.2	0.02
89*	Scattering of radio waves in the ionosphere and long-range propagation of ultra-short waves, J. L. ALPERT.	9	0.1.6	0.18

N°	Titles and Authors	F.B.	£	$
90**	Analysis of the waveforms of atmospherics and the velocity of audio frequency electromagnetic waves, J. L. ALPERT, S. V. BORODINA.	1	0.0.2	0.02
91*	Investigation of the ionosphere layer of height irregular structures during simultaneous reception at different frequencies V. D. GUSSEV, S. F. MIRKOTAN, M. S. U., Faculty of Physics, U.S.S.R.	8	0.1.4	0.16
92*	Investigation of ionospheric irregularities by means of measuring phase path variations of a radio-pulse reflected from the ionosphere, V. D. GUSSEV, L. A. DRATSHEV, *Ibid.*	6	0.1.0	0.12
104*	Preliminary results of an investigation of propagation conditions at very low frequencies, R. LINDQUIST, Research Board National Defence, Stockholm, Sweden.	8	0.1.4	0.16
116*	Lunar tidal variations of midday critical frequencies and lowest night-time frequencies of the F2 layer at Slough and Lindau, G. LANGE-HESSE, E. SCHOTT, Max-Planck Institute für Physik der Physik der Ionosphäre, West Germany.	7	0.1.2	0.14
177*	On the origin of radar echoes associated with auroral activity, J. MEOS, S. OLVING, Research Laboratory of Electronics, Chalmers University of Technology, Gothenburg, Sweden.	11	0.1.10	0.22
D*	La Théorie Magnéto-ionique et la Région E, Les Triples Fourches, D. LEPECHINSKY Plus, addition.	13	0.2.2	0.26
E**	Ionosphere Electron Densities and Differential Absorption, SEDDON, CART and JACKSON.	2	0.0.4	0.04
F**	Ionosphere Soundings at Low Frequencies J. M. WATTS.	2	0.0.4	0.04
G**	Ionospheric Effects of the Great Solar Outburst of February 23, 1956, KNECHT.	1	0.0.2	0.02
H*	The Thermal and Gravitational Excitation of Atmospheric Currents, M. L. WHITE.	5	0.0.10	0.10

N°	Titles and Authors	F.B.	£	$
I**	Ionospheric Storm Analysis from « *f*-plots » A. H. SHAPLEY.	1	0.0.2	0.02
J**	The Morphology of Ionospheric Storms, M. SUGUIRA, R. NORTON.	1	0.0.2	0.02
K**	On the Directional Properties of the Meteor Burst Propagation, V. R. ESHLEMAN, R. F. MLODNOSKY.	1	0.0.2	0.02
N*	Mode Identification, MUF, and Wave Angles in Long-Distance High Frequency Propagation, Richard SILBERSTEIN.	8	0.1.4	0.16
O*	World-Wide Observation of Short-wave Fadeouts, J. Virginia LINCOLN.	3	0.0.6	0.06
Q*	The Initial Radius of Meteoric Ionization Trails, A. MANNING.	2	0.0.4	0.04
R**	Whistlers and Associated Phenomena, R. A. HELLIWELL.	2	0.0.4	0.04
S**	The Third Magnetoionic Reflection Level J. W. WRIGHT.	1	0.0.2	0.02
U**	Radar Studies of 15th Magnitude Meteors, P. B. GALLAGHER, V. R. ESHLEMAN.	2	0.0.4	0.04
W**	A Fading Origin Experiment for Radio Waves Reflected from the Ionosphere, T. N. GAUTIER, R. S. LAWRENCE, W. F. UTLENT, B. WEEDER.	1	0.0.2	0.02
1194*	Propagation d'une Onde Electromagnétique Plane à travers une couche ionisée d'épaisseur finie en présence de chocs, P. POINCELOT, L. ROBIN.	11	0.1.10	0.22
1195*	Influence de l'absorption sur le coefficient de réflexion de l'ionosphère, P. POINCELOT.	5	0.0.10	0.10

List of documents submitted to Commission IV

N°	Titles and Authors	F.B.	£	$
36*	Field-changes due to lightning discharges and their mechanisms, N. KITAGAWA, Meteorological Research Institute, Suginami, Tokyo.	6	0.1.0	0.12

N°	Titles and Authors	F.B.	£	$
37*	Lightning mechanisms and radiation atmospherics, H. ISIKAWA, Research Institute of Atmospherics, Nagoya University, Japan.	5	0.0.10	0.10
38**	The Waveform of atmospherics in the Far East, A. KIMPARA, *Ibid.*	1	0.0.2	0.02
39*	Some results of simultaneous measurement of atmospheric noise intensities by various meters, A. KIMPARA, Nagoya University, H. SHINKAWA, Overseas Telegraph and Telephone Service, T. FUJITA, N. H. K. Technical Laboratories, Y. AONO, Radio Research Laboratories, Y. TAKI, Tokyo University, F. MINOZUMA, Radio Regulatory Bureau.	7	0.1.2	0.14
40*	Measurement of amplitude probability distribution of atmospheric noise in high frequency band, T. ISHIDA, Radio Research Laboratories, Japan.	7	0.1.2	0.14
41*	On an investigation of whistling atmospherics in Japan, A. KIMPARA, A. IWAI, J. OUTSU, Research Institute of Atmospherics, Nagoya University.	6	0.1.0	0.12
115*	Waveform studies of electric field-changes during cloud-to-cloud lightning discharges : B. A. P. TANTRY, M. Sc., Ph. D., R. S. SRIVASTA, M. Sc., S. R. KHASTGIR, D. Sc., Banaras Hindu University.	8	0.1.4	0.16
126*	Atmospheric radio noise at frequencies between 10 kc/s and 30 kc/s, J. HARWOOD, Radio Research Station, D.S.I.R. Slough, England.	5	0.0.10	0.10
127*	The relation between atmospheric radio noise and lightning, F. HORNER.	5	0.0.10	0.10
151*	The use of magnetic tape recording for studying atmospheric noise structure, C. CLARKE, A.M.I.E.E., Radio Research Station, D.S.I.R., Slough, England.	6	0.1.0	0.12
239*	Lightning discharge channel characteristics and related atmospherics radio interference, M. M. NEWMAN, Lightning and Transients Research Institute, Minneapolis, Minnesota.	1	0.0.2	0.02

N°	Titles and Authors	F.B.	£	$
254*	Report of sub-commission on the question: what are the most readily measured characteristics of terrestrial radio noise from which the interference of different types of communication systems can be determined, W. Q. CRICHLOW.	48	0.8.0	0.96
267*	Results obtained recently regarding the mechanism of lightning discharges, H. NORINDER.	26	0.4.4	0.52

List of documents submitted to Commission V

N°	Titles and Authors	F.B.	£	$
2*	Report from Sub-Commission V*a*, on the continuous 24 hour survey of solar radio emission, A. H. DE VOOGT, Chairman.	3	0.0.6	0.06
42*	A multiphase radio interferometer for locating the sources of solar radio bursts, T. HATANAKA, S. SUZUKI, Tokyo Astronomical Observatory, University of Tokyo.	8	0.1.4	0.16
43*	Emission mechanism of polarized radio bursts, T. TAKAKURA, *Ibid.*	8	0.1.4	0.16
44**	The position and size of the source of the most intense solar-noise burst on February 23, 1956, at a frequency of 4000 Mc/s, H. TANAKA, T. MAKINUMA; The Research Institute of Atmospherics, Nagoya University.	1	0.0.2	0.02
45**	Direct measurements of polarization of the radiation from individual radio spot at a frequency of 4000 Mc/s, same authors.	1	0.0.2	0.02
64**	About one possiblity of using small-aperture antennas for estimating the position of local sources of radio waves on the Sun's disk, J. BUDEJICKY; Astronomical Institute of the Czechoslovakian Academy of Sciences.	1	0.0.2	0.02
93*	On solar radio emission, V. V. VITKEVITCH.	9	0.1.6	0.18

N°	Titles and Authors	F.B.	£	$
94*	Research on the irregular structure of the ionosphere by means of radio-astronomical methods, V. V. VITKEVITCH, J. L. KOKURIN.	9	0.1.6	0.18
95**	Observations of polarized sunspot radiation at a wavelength of 3 cm, D. V. KOROTKOV, N. S. SOBOLEVA.	1	0.0.2	0.02
177*	On the origin of radar echoes associated with auroral activity, J. MEOS, S. OLVING Research Laboratory of Electronics, Chalmers University of Technology, Gothenburg, Sweden.	11	0.1.10	0.22
259*	Instrumentation techniques in radio astronomy, P. D. STRUM.	2	0.0.4	0.04
260*	An X-band switched source comparison radiometer, H. I. EWEN.	2	0.0.4	0.04
264**	The fading of meteoric radio echoes, A. MANNING.	2	0.0.4	0.04
265**	X-band observations of radio stars and planets, F. DRAKE.	1	0.0.2	0.02
266**	Oblique meteoric echoes from over-dense trails, A. MANNING.	1	0.0.2	0.02
C*	A new type of radio interferometer (Hays Pensfield).	8	0.1.4	0.16

List of documents submitted to Commission VI

N°	Titles and Authors	F.B.	£	$
5*	Contribution à l'étude du bruit de fond optique. Comparaison avec le bruit en radioélectricité, A. BLANC-LAPIERRE, Prof. Faculté des Sciences d'Alger.	6	0.1.0	0.12
7*	Etude sur la notion de spectre instantané de puissance, A. BLANC-LAPIERRE et B. PICINBONO, Laboratoire de Physique Théorique de la Faculté des Sciences d'Alger.	9	0.1.6	0.18
8*	Canaux binaires en cascade, J. LOEB.	9	0.1.6	0.18

N°	Titles and Authors	F.B.	£	$
13**	Spectre instantané et analyse du signal. Applications aux problèmes de transmission dans les télécommunications, P. DEMAN.	1	0.0.2	0.02
46*	On the capacity of a noisy continuous channel, S. MUROGA, Electrical Communication Laboratory, Nippon Telephone and Telegraph Corporation, Tokyo.	9	0.1.6	0.18
47*	On the capacity of discrete channel, II mathematical expression of the capacity of a noisy channel which is expressible by corresponding two multi-state diagrams, same author.	7	0.1.2	0.14
48*	Double sampling theorems in continuous signals, N. HONDA, Faculty of Engineerings, Tohoku University, Sendai, Japan.	7	0.1.2	0.14
49*	Transformation of probability distributions and its application to compendor system, H. MINE, Faculty of Engineering, Osaka University, Osaka, Japan.	6	0.1.0	0.12
50**	The parametron, an amplifying and logical element using varying-parameter resonators, H. TAKAHASI, E. GOTO, Department of Physics, University of Tokyo	1	0.0.2	0.02
51*	General solutions of the logical algebraic equation with many unknowns, M. GOTO, Electrotechnical Laboratory, Japanese Government.	6	0.1.0	0.12
52*	Theory of negative impedance converter, H. HIRAYAMA, Faculty of Engineering, Waseda University, Tokyo.	8	0.1.4	0.16
53*	The expansion of electromagnetic fields in cavities, K. KUROKAWA, University of Tokyo.	5	0.0.10	0.10
55*	On the transition from a ground return circuit to a surface waveguide, H. KIKUCHI, Electrotechnical Laboratory, Ministry of International Trade and Industry, Japan.	10	0.1.8	0.20
56*	Pseudo-electromagnetic retarding medium using loop coils, K. MORITA, Tokyo Institute of Technology.	8	0.1.4	0.16

N°	Titles and Authors	F.B.	£	$
57**	A M. derived waveguide filter, H. YANAI, J. HAMASAKI, Faculty of Engineering, University of Tokyo.	1	0.0.2	0.02
58*	A distributed coupled surface wave bandpassfilter, Y. MORIWAKI, T. KAWAMURA, Institute of Industrial Science, University of Tokyo.	8	0.1.4	0.16
59**	A broadband coaxial-to-waveguide junction, S. TANAKA, Matsuda Research Laboratory, Tokyo-Shibaura Electric Company, Kawasaki.	1	0.0.2	0.02
60*	Current distribution on a rectangular plate and its effective area, K. MORITA, T. SEKIGUEKI, Tokyo Institute of Technology.	6	0.1.0	0.12
61*	A new broadband antenna, S. OKAMURA, M. SUMITA, University of Electrocommunications, Tokyo.	7	0.1.2	0.14
62*	A wide band microwave antenna using circularly polarized waves, S. KAWAZU, Electrical Communication Laboratory, Nippon Telephone and Telegraph Corp., Japan.	8	0.1.4	0.16
63*	A corrugated plane reflector, Y. MORIWAKI, T. KAWAMURA, Institute of Industrial Science, University of Tokyo.	8	0.1.4	0.16
68**	Electromagnetic Properties of a rotating plasma, E. CHVOJKOVA.	1	0.2.0	0.02
73**	Second-harmonic signal generator with semi-conductor diodes, J. KARPINSKY.	1	0.0.2	0.02
74**	Contribution to the theory of the exponential step-lines, B. G. KAZANSKI, Radio and Electronics Institute, Czecholovak Academy of Sciences.	1	0.0.2	0.02
75*	Notes on transmission line equations in terms of normalized impedance and reflection coefficient, B. G. KAZANSKY.	10	0.1.8	0.20
80*	A new method for measuring phase and amplitude distribution of antenna currents, as applied to the reflection-free antenna, E. CASSEL, The Royal Institute of Technology, Division of Theoretical Electrical Engineering, Stockholm.	10	0.1.8	0.20

N°	Titles and Authors	F.B.	£	$
82*	The reflection of electromagnetic waves in rough surfaces, Ing. P. Beckmann.	6	0.1.0	0.12
96**	Correlation theory of electric fluctuations and thermal radiation, S. M. Rytov.	1	0.0.2	0.02
97**	Fluctuation de phase des auto-oscillations. Théorie et méthodes de mesure, G. Gorélik, G. Iolkine.	1	0.0.2	0.02
98**	Circulation d'impulsions dans un système fortement non-linéaire à rétroaction retardée, Y. Neimark, Y. Maklakov, L. Iolkine.	1	0.0.2	0.02
99*	Frequency conversion by a reflex klystron E. N. Bazarov, M. E. Zhabotinsky, Institute of Radio Engineering and Electronics, U.S.S.R. Academy of Sciences.	10	0.1.8	0.20
100*	Group velocity of attenuated waves, L. A. Wainstein.	6	0.1.0	0.12
101**	On the theory of the maser and fluctuations of its oscillations, V. S. Troitzky, Radio-physical Institute of the Gorky State University.	1	0.0.2	0.02
102*	Surface electromagnetic waves, M. A. Miller, V. I. Talanov.	8	0.1.4	0.16
106**	Remarks on statistical methods in Communication theory, J. Seidler.	1	0.0.2	0.02
107**	La systématisation de l'influence des facteurs non-linéaires sur la fréquence du générateur, L. C., J. Groszkowski.	1	0.0.2	0.02
108**	Uniform realization of operators by means of linear elements, R. Kulikowski.	1	0.0.2	0.02
109**	Estimation methods in the theory of non-linear and parametric filters, R. Kulikowski.			
110*	Pulse propagation in wave guides, R. Gajewski.	6	0.1.0	0.12
118*	Analysis of d. c. networks including ideal rectifiers, G. Biorci, Istituto Elettrotecnico Nazionale « Galileo Ferraris », Torino, Italy.	3	0.0.6	0.06

N°	Titles and Authors	F.B.	£	$
119*	Les bipôles à résistance négative interprétés comme des éléments avec réaction à commande de tension ou de courant, L. PIGLIONE.	3	0.0.6	0.06
121**	Operational calculus, Fourier Transform or Laplace transform? W. Proctor WILSON, C. G. MAYO, J. W. HEAD, Research Department, BBC Engineering Division.	1	0.0.2	0.02
134*	The negative entropy recorded information, D. A. BELL, University of Birmingham.	5	0.0.10	0.10
135*	Propagation characteristics of low-loss tubular metal waveguides, Prof. H. M. BARLOW, University College, London.	10	0.1.8	0.20
150*	Survey of circuit theory, Report of Sub-Commission V1-2 on Circuit Theory, Prof. Ir. B. H. D. TELLEGEN, Chairman.	9	0.1.6	0.18
154*	Project of an U.R.S.I. monography. Information theory of a complete communication system, J. LOEB, Vice-Chairman, Commission VI.	6	0.1.0	0.12
221*	Transition convertissant les ondes Te_{01} rectangulaire en Te_{01} circulaire, M. P. MARIÉ, Centre National d'Etudes des Télécommunications.	3	0.0.6	0.06
226*	Lentille focalisant les ondes à polarisation circulaire, suivant un mode donné, M. P. MARIÉ, Centre National d'Etudes des Télécommunications.	5	0.0.10	0.10
234*	On codes for error-correction and for automatic repetition systems, F. L. H. M. STUMPERS, Philips Research Laboratories.	6	0.1.0	0.12
261*	U.S.A. National Committee report, Subcomm. VI. 3.	9	0.1.6	0.18
262*	U.R.S.I. Comm. VI working group on microwave optics.	6	0.1.0	0.12
271*	Method of electronic photo-telegraphy with high efficiency of information transmission, V. A. SLYIN.	8	0.1.4	0.16
273*	On the capacity channels with random parameter fluctuations, SIFOROV.	6	0.1.0	0.12

List of documents submitted to Commission VII

N°	Titles and Authors	F.B.	£	$
103**	Electron waves in periodic structures, L. A. WAINSTEIN.	1	0.0.2	0.02
146*	Oscillation phenomena in gas discharges, W. P. ALLIS, Massachusetts Institute of Technology, Cambridge, Mass.	12	0.2.0	0.24
147*	The physics of the cathode, L. S. NERGAARD, R. C. A., Laboratories, Princeton, New-Jersey.	39	0.6.6	0.78
148*	The physics of semiconductor devices for radio application, W. SHOCKLEY, Shockley semiconductor Laboratory, Beckman Instrument Ltd., Mountain View Calif.	24	0.4.0	0.48

XIIIth GENERAL ASSEMBLY

The XIIth General Assembly, Boulder, 1957, accepted the invitation of the British National Committee to hold the XIIIth General Assembly in the United Kingdom in 1960.

This meeting will be held at the University College of the University of London from September 5 to 15, 1960.

The British National Committee has appointed a very general representative Committee (General Arrangements Committee) under the chairmanship of Mr. J. A. Ratcliffe, President of the British National Committee.

The General Arrangements Committee has appointed an Executive Committee which has the following sub-committees :

(*a*) Finance (*Chairman* : Dr. F. E. JONES).

(*b*) Scientific Programme (*Chairman* : Dr. R. L. SMITH-ROSE).

(*c*) Accommodation and registration of delegates (*Chairman* : Dr. L. ESSEN).

(*d*) Accommodation and conduct of meetings (*Chairman* : Prof. H. M. BARLOW).

(*e*) Entertainment and Visits (*Chairman* : Mr. W. K. BRASHER).

(*f*) Ladies' Programme (*Chairman* : Mrs R. L. SMITH-ROSE).

A Coordinating office has been set up under Dr. R. L. Smith-Rose : XIIIth General Assembly U.R.S.I., 1960, London. Co-ordinating Office and Scientific Arrangements, Radio Research Station, D.S.I.R. Ditton Park, Slough, Bucks, England.

NATIONAL COMMITTEES

New scale of subscription

Until now the following National Committees have stated the category they have selected :

Australia : category 3 (500 $).
Austria : category 2 (250 $).
Canada : category 4 (1000 $).
Czechoslovakia : category 2 (250 $).
Finland : category 1 (125 $).
Germany : category 5 (2000 $).
Greece : category 2 (250 $).
Italy : category 4 (1000 $).
Japan : category 5 (2000 $).
Morocco : category 1 (125 $).
Netherlands : category 3 (500 $).
Norway : category 1 (125 $).
Poland : category 3 (500 $).
Sweden : category 2 (250 $).
Union of South Africa : category 2 (250 $).
U.S. S. R. : category 6 (4000 $).
United Kingdom : category 6 (4000 $).
United States of America : category 6 (4000 $).
Yugoslavia : category 3 (500 $).

Germany

NATIONAL COMMITEE'S ACTIVITIES

Fernmeldetechnisches Zentralamt Darmstadt

Ergebnisse der Ionosphärentagung (Kleinheubach 1951) ;

Vorträge und Berichte der gemeinsamen Tagung der Arbeitsgemeinschaft Ionosphäre und des Deutschen U.R.S.I.-Landesausschusses (Kelinheubach 1954 und Tübingen 1955) ;

Vorträge und Berichte der gemeinsamen Tagung der Arbeitsgemeinschaft Ionosphäre, des Deutschen U.R.S.I.-Landesausschusses und der Fachgruppe Wellenausbreitung der NTG (Kleinheubach 1956).

Proceedings of Meetings on the Ionosphere, on Wave propagation problems and on geophysical and astronomical questions ; meetings organized under the auspices of the German U.R.S.I. National Committee and of various organisms.

(*a*) *Proceedings of the Kleinheubach's meeting*, 1951 (108 p.) : General (J. BARTELS, W. MENZEL) ;

The Sun (A. BRUZEK, A. BEHR and H. SIEDENTOPF, L. BIERMANN, W. KROEBEL) ;

Ionosphere and ionospheric wave propagation (W. DIEMINGER, B. BECKMANN, L. MALSCH, O. BURKARD, W. SLAWYK, G. LANGE-HESSE, W. MENZEL, W. BECKER, W. DIEMINGER, J. KRAUTKRÄMER and W. NAUMAN, H. WUSTER, J. KAPLAN, A. SCHLÜTER, I. LUCAS, P. HÖLLER) ;

Géomagnétisme (J. BARTELS, O. MEYER, J. B. OSTERMEIER) ;

Radiation cosmique (A. SITTKUS, A. EHMERT, H. SALOW) ;

Météorologie et Ionosphère (H. ISRAEL, H. FLOHN, H. BERG, H. KOPPE, G. LEITHAUSER, H. SIEDENTOPF) ;

Propagation d'ondes ultracourtes (J. GROSSKOPF, W. SCHOLZ, H. FLEISCHER, W. KOPP, W. KOPP).

b) *Proceedings of the Kleinheubach's meeting*, 1954 (198 p.)

General (E. REGENER, W. DIEMINGER) ;

International meetings : U.R.S.I. Commissions at the XIth U.R.S.I. General Assembly in the Hague (A. SCHEIBE, J. GROSSKOPF, W. DIEMINGER, A. EHMERT, H. MEINKE, H. ZUHRT, J. MALSCH) ;

Conference on the Physics of the Ionosphere at Cambridge (Subject IV, W. BECKER) ;

Meeting of the U.G.G.I. in Rome on Atmospheric Electricity (R. MUHLEISEN) ;

Geomagnetism (J. BARTELS) ;

German participation to I.G.Y. (J. BARTELS) ;

Remarks on International Meetings (J. BARTELS) ;

Solar observations and Radioastronomy (O. HACHENBERG, H. SIEDENTOPF, G. ELWERT, A. BRUZEK) ;

Ionosphere (W. BECKER, G. LANGE-HESSE, H. BERG, J. PIETZNER, B. BECKMANN) ;

Solar eclipses and the Ionosphere (W. DIEMINGER, A. EHMERT, E. A. LAUTER, K. RAWER) ;

Propagation of Atmospherics (W. O. SCHUMANN, G. MATTERN) ;

Geomagnetism (Pulsations and K-indices : W. KERTZ) ;

Cosmic rays (A. SITTKUS, A. EHMERT) ;

Short wave propagation (O. HEER, B. ABILD) ;

Miscellaneous items (W. MEYER-EPPLER, H. K. PAETZOLD, H. SALOW).

c) *Proceedings of the Tübingen's meeting*, 1955 (201 p.) :

General (W. DIEMINGER) ;

International meetings : Symposium on the Ionosphere in Venice (W. DIEMINGER, K. RAWER) ;

C.S.A.G.I. Conference in Brussels (K. RAWER) ;

Symposium on Solar Eclipses and the Ionosphere in London (W. BECKER) ;

Solar observations and Radioastronomy (H. SIEDENTOPF and G. ELWERT, G. ELWERT) ;

Ionosphere (W. BECKER, R. EYFRIG, G. LEITHAUSER, W. MENZEL, J. PIETZNER, B. BECKMANN and K. VOGT, H. G. MOLLER, T. NAGATA, T. RIKITAKE and J. YOKOYAMA) ;

Ionospheric absorption (E. HARNISCHMACHER, E. A. LAUTER and K. SPRENGER, R. BUSCH and K. RAWER, K. RAWER and K. SUCHY) ;

Geomagnetism (H. VOLLAND, K. BURKHART) ;

Short wave propagation (K. BROCKS, R. SCHACHENMEIER, H. POEVERLEIN, B. ABILD, J. GROSSKOPF) ;

Miscellaneous items (H. ELSASSER and H. SIEDENTOPF, R. MUHLEISEN, H. K. PEATZOLD, W. O. SCHUMANN).

Proceedings of the Kleinheubach's meeting, 1956 (141 p.) :

General (A. HEILMANN, W. DIEMINGER, H. FLEISCHER) ;

Note on he VIIIth Plenary Assembly of the C.C.I.R. in Warsaw ;

Note on the German plans for the I.G.Y. (W. DIEMINGER, K. RAWER, B. BECKMANN) ;

Solar observations (G. ELWERT, G. ELWERT) ;

Ionosphere (W. BECKER, J. TAUBENHEIM, R. EYFRIG, K. RAWER, W BECKER, E. HARNISCHMACHER, B. BECKMANN and K. VOGT, A. OCHS, H. A. HESS, G. LANGE-HESSE) ;

Atmospherics (E. A. LAUTER) ;

Geomagnetism (H. VOLLAND) ;

Cosmic rays (S. CHAPMAN, A. EHMERT, P. DIETRICH, K. REVELLIO) ;

Tropospheric propagation (R. SCHUNEMANN ; G. ECKART, W. HORMUTH, H. WILLE) ;

Miscellaneous items (W. MENZEL, H. BERG).

U. S. A.

JOINT MEETING OF THE U.R.S.I. NATIONAL COMMITTEE AND THE INSTITUTE OF RADIO ENGINEERS

Washington, May 22-25, 1957

PAPERS SUBMITTED TO THE MEETING

COMMISSION I

1. A stable high-*q* parallel-resonant circuit — J. Carl SEDDON, *U. S. Naval Research Laboratory.*
2. Electromagnetic field theory as applied to radio interference measurements — William JARVA, *Filtron Campany, Inc.*
3. An all transistor PDM telemetry coder — James S. SHERWIN, *U. S. Naval Ordnance Test Station.*
4. Digital rate synthesis. A method for the precise measurement and control of frequency — Thomas J. REY, *Glen Burnie, Md.*
5. Data reduction equipment for a « forward scatter » link — Donald EADIE, *University of Florida.*

6. An automatic phase measuring circuit for microwaves — R. MITTRA, The Pennsylvania State University.
7. An adjustable sliding termination for rectangular wave-guide — R. W. BEATTY, *National Bureau of Standards.*
8. Measurements of the refractive index of various aerosols at a frequency of 9400 megacycles — C. M. CRAIN, J. E. BOGGS and D. THORN, *The University of Texas.*
9. Frequency stabilization of variable oscillators — D. MAKOW, *National* Research Council (Canada).
10. Design of narrow band microwave filters — J. J. TAUBE and B. F. BOGNER, Airborne Instruments Laboratory.

COMMISSION II

1. A new technique for the study of magnetic-ionic duct propagation at very low frequencies — R. A. HELLIWELL and E. GEHRELS, *Radio Propagation Laboratory Stanford University, Stanford, California.*
2. Experimental investigations of the angular scattering and multipath delays for transmissions beyond the horizon — James H. CHISHOLM, James F. ROCHE, William J. JONES, *Staff Members, Lincoln Laboratory, Massachusetts Institute of Technology.*
3. An analysis of the time and space scale problems in radio meteorology — Arthur ENGELMAN and Lawrence COLIN, *Rome Air Development Center.*
4. A 216-mile 2700 Mc/s scatter link — L. H. DOHERTY, *National Research Council (Canada).*
5. A statistical model for forward scattering of waves off a rough surface — L. M. SPETNER, *The Johns Hopkins University.*
6. High altitude VHF tropospheric field strengths measured to great distances beyond the radio horizon — L. A. AMES, N. L. CONGER 1st Lt. U.S.A. F, J. W. FRAZIER, E. J. MARTIN, T. F. ROGERS, *Air Force Cambridge Research Center.*
7. Investigation of long-distance over-water tropospheric propagation at 400 Mc — H. E. DINGER, W. E. GARNER, *U. S. Naval Research Laboratory*; D. H. HAMILTON, Jr., A. E. TEACHMAN, *M. I. T. Lincoln Laboratory.*
8. The spectrum of turbulent mixing and its application to scatter propagation — Ralph BOLGIANO, Jr., *Cornell University.*
9. The fading of radio waves scattered by dielectric turbulence — Richard A. SILVERMAN, *New-York University.*
10. The relation of radio measurements to the spectrum of tropospheric dielectric fluctuations — Albert D. WHEELON, *The Ramo-Wooldridge Corporation.*

11. Meteorological correlations with a scatter signal — W. S. AMENT, F. C. MACDONALD, D. L. RINGWALT, *U. S. Naval Research Laboratory.*
12. Theory of scattering from nearly transparent anomaly — Victor W. BOLIE, *Collins Radio Company.*
13. Characteristics of signals received on a large aperture antenna in propagation beyond-the-horizon — W. H. KUMMER and D. C. HOGG, *Bell Telephone Laboratories, Inc.*
14. Some generalized tropospheric scattering relationships as applied to transhorizon microwave propagation — A. T. WATERMAN, Jr., *Stanford University.*
15. Resolution of vertical incidence radar return into random and specular component — R. K. MOORE, *University of New Mexico.*
16. Comparison of measured and predicted tropospheric bending of electromagnetic waves — L. J. ANDERSON, L. G. TROLESE and J. B. SMYTH, *Research Associates.*
17. Propagation through the troposphere and ionosphere — Virgil A. COUNTER and E. Paul RIEDEL, *Lockheed Aircraft Corp.*
18. Back scattering from the sea and land at centimeter and millimeter wavelengths — C. R. GRANT and B. S. YAPLEE, *U. S. Naval Research Laboratory.*

COMMISSION III

1. A recent NRL rocket measurement of ionospheric electron densities — J. A. KANE and J. E. JACKSON, *U. S. Naval Research Laboratory, Washington, D. C.*
2. Electron distribution in a new model of the ionosphere — H. K. KALMANN, *Institute of Geophysics, University of California at Los Angeles.*
3. Differential absorption in the D and lower E regions — J. Carl SEDDON, *U. S. Naval Research Laboratory, Washington D. C.*
4. The effect of various radiations on the E-layer of the Ionosphere — R. E. HOUSTON, Jr., *Ionosphere Research Laboratory, The Pennsylvania State University, University Park, Pennsylvania.*
5. Measurement and interpretation of tidal effects in the equatorial ionosphere — G. J. GASSMANN, *Ionospheric Physics Laboratory, Geophysics Research Directorate, Air Force Cambridge Research Center.*
6. Inclusion of the earth's magnetic field in a simple and rapid method for reducing h^1-f curves to electron-density — E. R. SCHMERLING, *Ionosphere Research Laboratory, The Pennsylvania State University, University Park, Pennsylvania.*
7. On the measurement of virtual height — Irving KAY, *New York University, Institute of Mathematical Sciences, Division of Electromagnetic Research.*

8. Flight measurements of transmission loss at 38.5 Mc — I. H. GERKS *Collins Radio Company.*
9. An experimental investigation of ionospheric forward scattering at HF — Donald A. HEDLUND and Leonard C. EDWARDS, *Raytheon Manufacturing Company.*
10. On the reception of HF waves above the classical MUF — Martin BALSER, *M.I.T., Lincoln Laboratory.*
11. The reflection-scatter MUF — E. WARREN and L. HAGG.
12. A fading origin experiment for radio waves reflected from the ionosphere — T. N. GAUTIER, R. S. LAWRENCE, W. F. UTLAUT, B. WIEDER *National Bureau of Standards.*
13. Some preliminary characteristics of meteor echoes as determined by radar investigations at frequencies of 100, 200 and 400 Mc — Allen M. PETERSON, Ray L. LEADABRAND and Robert A. RACH, *Stanford Research Institute.*
14. The fading of meteoric radio echoes — Laurence A. MANNING, *Stanford University.*
15. Forward scattering by reflections from meteor trails of a UHF signal over an 830 mile path — James H. CHISHOLM, Morton LOEWENTHAL, Alfred E. TEACHMAN, *M.I.T., Lincoln Laboratory.*
16. On the diurnal changes of the optimum antenna bearings for meteor burst propagation : Part 1 ; Measurements for N-S and E-W paths A. M. PETERSON and W. R. VINCENT, *Stanford Research Institute.*
17. On the diurnal changes of the optimum antenna bearing for meteor burst propagation : Part II, predictions based on theory and radar measurement of the meteor radiant distribution — V. R. ESHLEMAN and R. F. MLODNOSKY, *Stanford University.*
18. Radar studies of meteor down to 15th magnitude — P. B. GALLAGHER and V. R. ESHLEMAN, *Stanford University.*
19. The clustering of meteor bursts at twenty megacycles over a 608 kilometer path — Lloyd R. WYLIE, *Wittenberg College and* Horace T. CASTILLO, *Wright Air Development Center.*
20. Ionospheric effects of the great solar-cosmic ray event of February 23, 1956 — A. H. SHAPLEY and R. W. KNECHT, *National Bureau of Standards.*
21. Observations of the geographical position and extent of regions of anomalous high-latitude absorption — H. LEINBACH and C. G. LITTLE, *University of Alaska.*
22. 398 Mc Auroral echoes observed at College, Alaska — A. M. PETERSON, Ray L. LEADABRAND, Rolf B. DYCE, *University of Alaska.*
23. UHF Auroral observations — S. J. FRICKER, R. P. INGALLS, M. L. STONE, S. C. WANG, *Lincoln Laboratory, M.I.T.*
24. Some VHF sporadic-E results — R. M. DAVIS, Jr., J. W. FINNEY, E. K. SMITH, Jr., D. H. ZACHARISEN, *National Bureau of Standards.*

25. Variations of E-layer « scatter » receptions with *fEs* — M. Lindeman Phillips, *Lincoln Laboratory, M.I.T.*
26. Magnetic storm effects in the inner and outer ionosphere — S. F. Singer, *University of Maryland.*
27. A long distance pulse propagation experiment on 20.1 megacycles — Richard Silberstein, *National Bureau of Standards.*
28. Numerical computations from the theory of VLF noise emissions and their comparison with observations — Roger M. Gallet and Anne Hessing, *National Bureau of Standards.*
29. Computation of group indices and group heights for low frequencies — H. J. Gibbons, *The Pennsylvania State University.*
30. Ionospheric reflection of very low frequencies — H. Poeverlein, *Air Force Cambridge Research Center.*
31. Effects of ionospheric layer tilts on high frequency radio propagation. *Sidney Stein, Stanford University.*

Commission IV

1. The radio noise environment resulting from extra-terrestrial sources — L. R. Hughes, *Smyth Research Associates, San Diego, California.*
2. An experimental system for studying the zeros of gaussian noise — Gerald M. White, *Harvard University.*
3. Lightning discharge measurements — M. M. Newman, *Lightning and Transients Research Institute.*
4. Periodicity in dawn chorus — Harold E. Dinger, *U. S. Naval Research Laboratory.*
5. Unusual sferic phenomenon observed during tornado season of 1956 — Herbert L. Jones, *Oklahoma A and M College.*

Commission V

1. Some solar observations with the Cornell narrow-Band radio polarimeter — M. H. Cohen and E. R. Schiffmacher, *Cornell University.*
2. A further analysis of a solar-terrestrial correlation — K. Toman.
3. Fluctuations in the apparent amplitude and position of extra-terrestrial radio sources, as observed near the auroral zone — J. M. Lansinger, C. G. Little, R. P. Merritt and E. Stiltner, *Geophysical Institute of the University of Alaska.*
4. X-ray flares and sudden ionospheric disturbances — T. A. Chubb, H. Friedmann and J. E. Kupperian, Jr., *U. S. Naval Research Laboratory.*
5. Post-CMP geomagnetic effects of solar event-producing regions — Marion B. Wood, *National Bureau of Standards.*
6. Radar scattering by meteor trails — H. Brysk, *University of Michigan.*

7. Radar echoes from over-dense meteor trails under conditions of severe diffusion, Gerald S. HAWKINS and Donald F. WINTER, *Harvard College Observatory.*
8. Refraction, scintillation, and absorption measurements at microwave and meter wavelengths — Jules AARONS, John CASTELLI and William BARRON, *Air Force Cambridge Research Center.*
9. Back scattering from the sea and land at centimeter and millimeter wavelengths — C. R. GRANT and B. S. YAPLEE, *U. S. Naval Research Laboratory.*
10. A comparison of phase modulated interferometers — Donald J. FARMER, *The Ramo-Wooldridge Corporation.*
11. The results of the observations of Jupiter's radio emissions on 18 and 20 Mc/s in 1956 and 1957 — Roger M. GALLET, *National Bureau of Standards.*
12. Observations of radio stars and selected regions of the galactic plane at 440 Mc/s — Nancy G. ROMAN, B. S. YAPLEE, *U. S. Naval Research Laboratory.*

COMMISSION VI

1. Microwave antenna and waveguide techniques before 1900 — John F. RAMSAY, *Canadian Marconi Company.*
2. Antenna resolution as limited by atmospheric turbulence — C. M. ANGULO, *Brown University*; J. P. RUINA, *University of Illinois.*
3. On multiple scattering of waves by plane bounded volume distributions — Victor TWERSKY, *Sylvania Electronic Defence Laboratory.*
4. A new approach to diffraction of high-frequency waves by ellipsoids of revolution — Nelson A. LOGAN, *Antenna Laboratory, Air Force Cambridge Research Center.*
5. Effects of satellite spin on ground-received signals — T. J. BOLLJAHN, *Stanford Research Institute.*
6. An analytical Study of scattering by thin dielectric rings — Lloyd L. PHILIPSON, *Hughes Aircraft Company.*
7. Perturbations method for calculating diffraction by an almost ideal obstacle — C. B. SHAW, Jr., *Hughes Aircraft Company.*
8. Radiation from slots on dielectric clad and corrugated cylinders — James R. WAIT, Alyce M. CONDA, *National Bureau of Standards.*
9. Transverse resonance analysis of flush-mounted antennas — R. C. HONEY, *Stanford Research Institute.*
10. A new broadband conical helix antenna — Milton NUSSBAUM, *American Electronic Laboratories, Inc.*
11. Some results concerning the Fresnel region of constant phase rectangular apertures — Charles POLK, *RCA Laboratories, Princeton, N. J.*
12. Characteristics of thin wire loop and biconical antennas with spherical ferrite core — J. HERMAN, *Diamond Ordnance Fuze Laboratories.*

13. Orthogonality properties of modes in uniform waveguides containing anisotropic media. — A. D. Bresler and N. Marcuvitz, *Polytechnic Institute of Brooklyn.*

14. Theory of mode coupling, Part I : Derivation of the mode coupling formalism — H. A. Haus and L. N. Howard, *Research Laboratory of Electronics, M.I.T.*

15. Theory of mode coupling, Part II : Mode coupling as an eigenvalue problem — L. N. Howard and H. A. Haus, *Research Laboratory of Electronics, M.I.T.*

16. Radiation from a rectangular waveguide filled with ferrite — Georges Tyras, *Boeing Airplane Company and Gedaliah Held, University of Washington.*

17. The internal magnetic field of ferrite ellipsoid. — R. A. Hurd, *National Research Council (Canada).*

18. High frequency scattering based on the Fock approximation, I-Theory — S. J. Rabinowitz, *The W. L. Maxson Corporation.*

19. High frequency scattering based on the Fock approximation, II-Experiment — S. J. Rabinowitz, *The W. L. Maxson Corporation.*

20. The role of Fock functions in the theory of diffraction by convex surfaces — Nelson A. Logan, *Air Force Cambridge Research Center.*

21. Electromagnetic back-scattering cross-sections of dielectric-coated infinite cylindrical obstacles — Charles C. H. Tang, *Gordon McKay Laboratory, Harvard University.*

22. Network representation of infinite gratings for obliquely incident waves — L. O. Goldtsone and H. M. Altschuler, *Microwave Research Institute, Polytechnic Institute of Brooklyn.*

23. The resonant conductance of slots in linear and twodimensional arrays — G. C. McCormick, *National Research Council (Canada).*

24. Wavelength correction in a microwave interferometer — David M. Kerns, *National Bureau of Standards.*

25. Coherent integration of doppler echoes in pulse radar — Bernard D. Steinberg, *General Atronics Corporation.*

26. Information theory applied to the human visual system — Jerome R. Singer, *National Scientific Laboratories, Inc.*

27. Impulse response of cascaded double tuned circuits — Yona Peless.

28. Some applications of the isometric circle method to impedance transformations through lossless two-port networks — E. F. Bolinder.

29. On the theory of pulse transmission and reception — N. DeClaris, *Cornell University.*

30. Microwave diagnostics for high temperature plasmas — Charles B. Wharton, *University of California.*

31. General synthesis of a class of waveguide filters — Henry J. Riblet, *Microwave Development Laboratories.*

32. The approximate parameters of slot lines and their complement — Gilbert H. Owyang and Tai Tsun Wu, *Gordon McKay Laboratory, Harvard University.*

33. Absorption of plane waves in an optimum non-uniform medium backed by a metallic surface — Ira Jacobs, *Whippany Laboratory, Bell Telephone Labs.*

34. Straight tapers in rectangular waveguides : a comparison of principal mode and non-uniform transmission line theories — T. J. Rey, *Glen Burnie, Maryland.*

35. On the construction of the Green's function for a non-uniform waveguide region or for waveguide regions filled with an inhomogeneous medium — R. Mittra, *College of Engineering and Architecture, Dept. of Electrical Engineering, The Pennsylvania State University.*

JOINT MEETING OF THE U.R.S.I. NATIONAL COMMITTEE AND THE INSTITUTE OF RADIO ENGINEERS

Washington, April 23-26, 1958

Papers submitted to the Meeting

Commission I

1. Frequency conversion by regenerative modulation — David M. Makow, *National Research Council, Radio and Electrical Engineering Division, Ottawa, Ontario, Canada.*

2. Canadian standard of frequency — S. N. Kalra, *National Research Council, Division of Applied Physics, Ottawa, Canada,* C. F. Pattenson, *National Research Council, Division of Radio and Electrical Engineering, Ottawa, Canada,* M. M. Thomson, *Dominion Observatory, Division of Positional Astronomy, Ottawa, Canada.*

3. An application of the quasi-peak circuit to the measurement of probability density function — Kamal Yacoub, *The Moore School of Engineering, University of Pennsylvania.*

4. Improvement of accuracy of field strength meters at VHF and UHF — Willmer K. Roberts, *Laboratory Division, Office of Chief Engineer, Federal Communications Commission, Laurel, Maryland.*

5. Status report on NH_3 Maser oscillator — S. Hopfer, *Polytechnic Research and Development Co., Inc. Brooklyn, N. Y.*

6. A wave propagation simulator — F. J. Fischer, *Department of Electrical Engineering, Ohio State University.*

7. Magnified and squared VSWR responses in microwave impedance measurements — R. W. Beatty, *National Bureau of Standards, Boulder Laboratories.*

8. A refined X-band microwave microcalorimeter — Glenn F. Engen, *National Bureau of Standards, Boulder Laboratories.*

9. A bolometer mount efficiency measurement technique — Glenn F. Engen, *National Bureau of Standards, Boulder Laboratories.*

10. A relative voltmeter for VHF/UHF signal generator attenuator calibration — B. O. Wainschel, G. U. Sorger, A. L. Hedrich, *Weinschel Engineering, Kensington, Maryland.*

11. Half-round inductive obstacles in rectangular waveguide as standards of impedance — D. M. Kerns, *National Bureau of Standards, Boulder Laboratories.*

12. A recording microwave hygrometer — C. M. Crain, *The Rand Corporation, Santa Monica, California,* J. B. Magee, *Tempco Aircraft, Dallas, Texas,* J. R. Gerhardt, *Electrical Engineering Research Laboratory, University of Texas.*

Commission II

1. Meteorological interpretation of wavelength dependence in trans-horizon propagation — Ralph Bolgiano, Jr., *Cornell University.*

2. Multiple scattering of electromagnetic radiation and the transport equation of diffusion — Dimitri S. Bugnolo, *Columbia University.*

3. Toward a solution of the tropospheric multiple scatter problem — W. S. Ament, *Naval Research Laboratory.*

4. Scattering of plane waves by locally homogeneous dielectric noise — R. A. Silverman, *Institute of Mathematical Sciences, New York University.*

5. Calculation of the fading rate for tropospheric scatter propagation — J. B. McGuire, A. D. Wheelon, *The Ramo-Wooldridge Corporation, Los Angeles, California.*

6. Measurements of the bandwith of radio waves propagated by the troposphere beyond the horizon — James H. Chisholm, Louis P. Rainville, James F. Roche, Henry G. Root, *Lincoln Laboratory, Massachusetts Institute of Technology.*

7. Diversity reception in scatter communication with emphasis on angle diversity — R. Bolgiano, Jr., N. H. Bryant, W. E. Gordon, *Cornell University.*

8. A radar terrain return model — I. Katz, L. M. Spetner, *Applied Physics Laboratory, The Johns Hopkins University.*

9. Twin-feed diversity studies in beyond-the-horizon propagation — W. H. Kummer, *Bell Telephone Laboratories, Inc. Holmdel, New Jersey.*

10. A beam swinging experiment on a short tropospheric path — A. W. Adey, W. J. Heikkila, C. A. May, S. Penstone, *Defence Research Telecommunications Establishment, Defence Research Board, Ottawa, Ontario, Canada.*

11. A rapid beam-swinging experiment — Alan T. Waterman, Jr., *Stanford Electronics Laboratories, Stanford University.*

12. Tropospheric refraction of radio waves at low angles to the horizon — J. R. Bauer, Florence A. Wilson, W. C. Mason, *Lincoln Laboratory, Massachusetts Institute of Technology.*

13. Computation of atmospheric refraction by ray-tracing and comparison with observed results — W. L. Anderson, *University of New Mexico,* N. J. Beyers, *Missile Geophysics Division, White Sands Signal Agency, White Sands Proving Grounds, New Mexico,* B. M. Fannin, *University of New Mexico.*

14. Measurement of atmospheric humidity fluctuations by the attenuation of Lyman alpha radiation — J. M. Bologna, O. K. Lorison, D. L. Randall, D. L. Ringwalt, *U. S. Naval Research Laboratory.*

15. Propagation at 36.000 Mc in the Los Angeles basin — W. L. Flock, R. C. Mackey, W. D. Hershberger, *Department of Engineering, University of California, Los Angeles.*

16. Some results from an over-water tropospheric propagation study — M. H. Latour, N. E. Rosier, W. F. Zetrouer, *Electrical Engineering Dept., University of Florida.*

17. Simplified method for computing knife-edge diffraction in the shadow region — L. J. Anderson, L. G. Trolese, *Smyth Research Associates, San Diego, California.*

18. Radiometric measurements at 4.3 millimeter wavelengths — C. W. Tolbert, C. O. Britt, A. W. Straiton, *The University of Texas.*

19. Effects of rainfall and anomalous propagation on transmission over short paths at X-band — W. C. Jakes, Jr., *Bell Telephone Laboratories, Inc., Holmdel, New Jersey.*

20. Reliability of radio propagation from 30 to 1000 Mc/s over line-of-sight paths — James Stewart Hill, 263 *North Main Street, Hudson, Ohio,* Kenneth L. Huntley, *Air Force Armament Center, Eglin Field, Florida.*

21. On the climatology of radio ducts — Bradford R. Bean, *National Bureau of Standards, Boulder Laboratories.*

22. Prediction of VHF, UHF transmission loss from an exponential model of the earth's atmosphere — P. L. Rice, *National Bureau of Standards, Boulder Laboratories.*

23. Microwave diffraction by terrain obstacles — F. J. Tischer, *Department of Electrical Engineering, Ohio, State University.*

Commission III

1. Lyman-alpha radiation as a source of night-time E-region ionization — H. Friedman, J. E. Kupperian, Jr., T. A. Chubb, *U. S. Naval Research Laboratory.*

2. Instrumentation for high-altitude geomagnetic measurements — J. P. Heppner, L. H. Meredith, *U. S. Naval Research Laboratory.*

3. The interpretation of high-frequency signal strength records from a missile — S. A. Bowhill, *Ionosphere Research Laboratory, Pennsylvania State University.*

4. Radar echoes obtained from earth satellites 1957 alpha and 1957 beta — A. M. Peterson, R. L. Leadabrand, R. B. Dyce, L. T. Dolphin, R. I. Presnell, *Stanford Research Institute.*

5. Ionospheric measurements using spaced-receiver Doppler observations of earth satellite radio transmission — W. J. Ross, *Ionosphere Research Laboratory, The Pennsylvania State University.*

6. Interferometric studies of satellite radio signals — Robert S. Lawrence, *National Bureau of Standards, Boulder Laboratories,* James W. Warwick, *High Altitude Observatory, University of Colorado,* Edward R. Schiffmacher, *National Bureau of Standards, Boulder Laboratories.*

7. Experimental measurement of electron density in the ionosphere using earth satellite radio emissions — P. R. Arendt, H. P. Hutchinson, *U. S. Army Signal Corps Engineering Laboratories.*

8. Lunar echo investigations at Stanford, California, and College, Alaska — L. T. Dolphin, R. I. Presnell, R. B. Dyce, M. R. Berg, R. L. Leadabrand, A. M. Peterson, *Stanford Research Institute.*

9. Propagation of electromagnetic waves through the ionosphere into outer space — W. Loreck, *The Martin Company, Denver, Colorado.*

10. On the fading and attenuation of high frequency radio waves over a long path crossing the auroral zone — K. C. Yeh, O. G. Villard, *Radio Propagation Laboratory, Stanford University.*

11. High altitude 106.1 Mc radio echoes from auroral ionization detected at a geomagnetic latitude of 43 degrees — A. M. Peterson, R. L. Leadabrand, R. B. Dyce, L. T. Dolphin, J. C. Schlobohm, *Stanford Research Institute.*

12. High latitude observations of radio star scintillations at VHF and UHF — C. G. Little, R. P. Merritt, E. Stiltner, *Geophysical Institute, University of Alaska.*

13. VHF auroral radar observations from a synchronized radar chain across the auroral zone in Canada — A. G. McNamara, *National Council of Canada.*

14. The polar spur as backscatter — E. Warren, E. E. Stevens, *Defence Research Board, Ottawa, Canada.*

15. Concerning the phenomenon of spread F in the ionosphere — Jacques Renau, *Cornell University.*

16. Comparison of preliminary results from three western United States I.G.Y. fixed-frequency scatter sounders — R. D. Egan, A. M. Peterson, *Stanford University.*

17. Characteristics of solar flares with short-wave fadeouts — C. B. Warwick, M. B. Wood, *National Bureau of Standards, Boulder Laboratories.*

18. Temporal and spatial variation of polar E*s* — R. Penndorf, S. C. Coroniti, *Electronics Research Laboratory, Research and Advanced Development Division, AVCO Manufacturing Corporation.*

19. Time constants in the geomagnetic storm effect — C. O. Hines, L. R. O. Storey, *Defence Research Board, Ottawa, Canada.*

20. The ionosphere at high southern latitudes — R. W. Knecht, Y. Aono, R. E. McDuffie, *National Bureau of Standards, Boulder Laboratories.*

21. A study of the morphology of ionospheric storms — S. Matsushita, *National Bureau of Standards, Boulder Laboratories and High Altitude Observatory of the University of Colorado,* R. B. Norton, *National Bureau of Standards, Boulder Laboratories,* M. Sugiura, *Geophysical Institute of University of Alaska.*

22. The influence of the solar cycle and magnetic activity on the lower ionosphere and VHF forward scatter — Hope I. Leighton, *National Bureau of Standards, Boulder Laboratories,* C. D. Ellyett, *University of Canterbury, Christchurch, New Zealand.*

23. Forward scattering by reflection from meteor trails of a UHF signal over a 830 mile path — M. Loewenthal, A. Teachman, L. P. Rainville, J. N. Pinkerton, W. J. Jones, H. H. Hoover, *Lincoln Laboratory, Massachusetts Institute of Technology.*

24. Theoretical basis for computing the signal rate in meteor scatter communication — M. L. Meeks, *Georgia Institute of Technology.*

25. A comparison between observed and computed meteor signal rates for various forward-scatter links — Jesse C. James, *Georgia Institute of Technology.*

26. An experimental study of meteor echoes at 200 Mc — J. L. Heritage, S. Weisbrod, W. Fay, *Smyth Research Associates, San Diego, California.*

27. VHF signal level measurements along a 2000 mile path — W. C. Abel, *Lincoln Laboratory, Massachusetts Institute of Technology,* A. S. Orange, *Massachusetts Institute of Technology and Air Force Cambridge Research Center,* T. F. Rogers, *Air Force Cambridge Research Center.*

28. The influence of continuous meteoric scattering on long distance VHF communication circuit design — T. F. Rogers, *Air Force Cambridge Research Center.*

29. 50 Mc oblique transmission experiment near the magnetic equator — R. S. Cohen, K. L. Bowles, *National Bureau of Standards, Boulder Laboratories.*

30. Integral equations for long-wave, vertical incidence ionospheric propagation and a method of their solution — J. M. Tomlinson, *Ionosphere Research Laboratory, The Pennsylvania State University.*
31. Coupling and polarization computation approximated by a single discontinuity in the medium — J. J. Gibbons, A. J. Ferraro, *Ionosphere Research Laboratory, The Pennsylvania State University.*
32. The interpretation of low frequency ionograms — James M. Watts, *National Bureau of Standards, Boulder Laboratories.*
33. Electron-density-height profiles from routine ionograms — E. R. Schmerling, *Ionosphere Research Laboratory, The Pennsylvania State University.*
34. Ionospheric drifts observed at low frequencies — Gary Sales, *Ionosphere Research Laboratory, The Pennsylvania State University.*
35. Application of a method for rapid calculation of group and phase heights and non-deviative absorption to 75 kc/s sunrise data — A. C. Aikin, J. J. Gibbons, *Ionosphere Research Laboratory, The Pennsylvania State University.*
36. On the earth geometry .A theorem — Kurt Toman, *Geophysics Research Directorate.*

Commission IV

1. Generation and coupling of radio noise from corona discharges — R. L. Tanner, *Stanford Research Institute.*
2. Error probability in a simulated binary communication system — F. Haber, J. T. Suss, *The Moore School of Engineering, University of Pennsylvania.*
3. Attenuation at VLF using sferics — William L. Taylor, *National Bureau of Standards, Boulder Laboratories.*
4. Some recent noise measurements and comparisons with predictions — W. Q. Crichlow, C. A. Samson, *National Bureau of Standards, Boulder Laboratories.*
5. Artificial sferics generation for interference reduction researches — M. M. Newman, *Lightning and Transients Research Institute, Minneapolis, Minnesota.*
6. Transmission of a radiofrequency ground wave pulse around a finitely conducting spherical earth — J. R. Johler, L. C. Walters, *National Bureau of Standards, Boulder Laboratories.*
7. Observations on some low frequency propagation paths in arctic areas. A. D. Watt, E. L. Maxwell, *National Bureau of Standards, Boulder Laboratories.*
8. UHF auroral observations — S. J. Fricker, R. P. Ingalls, W. C. Mason, M. L. Stone, *Lincoln Laboratory, Massachusetts Institute of Technology.*

9. 398 Mc auroral echoes obtained at College, Alaska — R. I. Presnell, R. L. Leadabrand, R. B. Dyce, L. T. Dolphin, A. M. Peterson, *Stanford Research Institute.*
10. Studies in the off-perpendicular geometry of aurora reflections — S. C. Wang, M. Loewenthal, P. A. Duffy, J. N. Skenian, *Lincoln Laboratory, Massachusetts Institute of Technology.*
11. A new theory of the aurora — S. F. Singer, *Physics Department, University of Maryland.*
12. Whistler paths in the outer ionosphere — Irving Yabroff, *Stanford Research Institute.*
13. Comparison of whistlers with magneto-ionic duct signals from station NSS — R. A. Helliwell, Ernst Gehrels, *Stanford University.*
14. Whistler propagation in regions of very low electron densities — Owen K. Garriott, *Stanford University.*
15. Pulse sky wave phenomena observed at 100 kc/s — Robert H. Doherty, *National Bureau of Standards, Boulder Laboratories.*

Commission V

1. The role of radar in space research — Benjamin S. Yaplee, *U. S. Naval Research Laboratory.*
2. A swept-lobe interferomter at 515 Mc/s — Robert Fleischer, Robert W. Redlich and Robert Keevers, *Observatory of Rensselaer Polytechnic Institute.*
3. The output fluctuations of radiometers — G. F. Mansur, *Collins Radio Company, Cedar Rapids, Iowa.*
4. The prediction of geomagnetic and ionospheric disturbances — T. R. Hartz, *Radio Physics Laboratory, Defence Research Board, Ottawa, Canada.*
5. Evidence of the first, second, and third harmonics of a solar radio burst and a new class of dynamic solar spectrum — F. T. Haddock, M. Winsnes, *University of Michigan.*
6. The slowly varying component of the solar radio emission — G. Swarup, *Stanford University,* R. Parthasarathy, *National Physical Laboratory of India, New Delhi.*
7. The slowly varying component of solar radiation at 340 Mc/s — J. W. Firor, *Department of Terrestrial Magnetism, Carnegie Institution of Washington.*
8. Limiting accuracy of open-wire transmission lines in positional radio astronomy — B. F. Burke, J. W. Firor, *Department of Terrestrial Magnetism, Carnegie Institution of Washington.*
9. Confusion effects in surveys of radio sources — B. F. Burke, *Department of Terrestrial Magnetism, Carnegie Institution of Washington.*

10. Observed 8.7 mm refraction as a function of surface meteorological conditions — Gene R. MARNER, Walter R. ILIFF, *Collins Radio Company, Cedar Rapids, Iowa.*
11. Absorption, refraction and scintillation measurements at 4700 Mc/s with a travelling wave tube radiometer — John CASTELLI, Carl FERIOLI, Jules AARONS, Joseph CASEY, *Propagation Laboratory, Electronics Research Directorate, Air Force Cambridge Research Center.*
12. Atmospheric factors affecting precision location of celestial radio sources — Wm. H. BELLVILLE, Walter R. ILIFF, John M. HOLT, *Collins Radio Company, Cedar Rapids, Iowa.*
13. Amplitude scintillation of extraterrestrial radio waves at UHF — H. C. Ko, *Chio State University.*
14. Atmospheric radiation received by directional antennas — Gene R. MARNER, *Collins Radio Company, Cedar Rapids, Iowa.*
15. New determinations of atmospheric microwave absorption by radio-astronomical methods — Gene R. MARNER, *Collins Radio Company, Cedar Rapids, Iowa.*
16. UHF moon reflections — S. J. FRICKER, R. P. INGALLS, W. C. MASON, M. L. STONE, *Lincoln Laboratory, Massachusetts Institute of Technology.*

COMMISSION VI

1. Theory of noisy two-port networks — E. FOLKE BOLINDER, *Antenna Laboratory, Electronics Research Directorate, Air Force Cambridge Research Center, Bedford, Massachusetts.*
2. Modular sequential circuits — Bernard FRIEDLAND, *Department of Electrical Engineering, Columbia University.*
3. Gaussian-response filter-design via modern network theory — Milton DISHAL, *Federal Telecommunications Laboratories, 500 Washington Ave., Nutley* 10, *N. J.*
4. Transistor distributed amplifier — B. J. HARPER, *University of New Mexico.*
5. Cascade directional filters — Omar WING, *Department of Electrical Engineering, Columbia University.*
6. General solution of the Luneberg lens problem — Samuel P. MORGAN, *Bell Telephone Laboratories, Inc., Murray Hill, New Jersey.*
7. Reflector antenna surface errors — K. S. KELLEHER, G. R. LOWREY, *Melpar, Inc. Falls Church, Virginia.*
8. Resonant slots having independent control of amplitude and phase — Bernard J. MAXUM, *Hughes Aircraft Company.*
9. The design of mirror-lenses for scanning — A. E. MARTSON, R. M. BROWN, *Microwave Antennas and Components Branch, Electronics Division, U. S. Naval Research Laboratory.*

10. The pattern of a vertical antenna on a curved lossy surface — James R. WAIT, Alyce M. CONDA, *National Bureau of Standards, Boulder Laboratories.*
11. Cross sections of large cylinders by the variational method — E. S. CASSEDY, Jr., *Radiation Laboratory, Johns Hopkins University.*
12. Diffraction by a wide slit and complementary strip — R. F. MILLAR, *Radio and Electrical Engineering Division, National Research Council, Ottawa, Canada.*
13. Properties of long slots in a parellel-plate transmission line — Alan J. SIMMONS, *Technical Research Group. Cambridge, Massachusetts.*
14. Propagation of electromagnetic waves in a semi-infinite, flanged, coaxial line with an infinite center conductor — V. M. PAPADOPOULOS, *Brown University, Providence, Rhode Island.*
15. Radiation field of an elliptical helical antenna — J. Y. WONG, S. C. LOH, *National Research Council, Ottawa, Canada.*
16. Generalization of the Dolph-Tchebyscheff method — C. SCHENSTED, *The University of Michigan.*
17. Extension of theory of thin wire loop antenna in air and with a spherical ferrite core — J. HERMAN, *Diamond Ordnance Fuze Laboratory, Washington, D. C.*
18. Leaky wave contributions to field of a magnetic line source above a dielectric slab — S. BARONE, A. HESSEL, *Microwave Research Institute, Polytechnic Institute of Brooklyn.*
19. Reflection and transmission by a class of curved dielectric layers — S. N. KARP, *Division of Electromagnetic Research, Institute of Mathematical Sciences, New York University.*
20. Two dimensional model for evaluation of radome analysis approximations — Alexander D. JACOBSON, *Microwave Laboratory, Hughes Aircraft Company.*
21. TE_{no} surface waves at a ferrite air interface — A. D. BRESLER, *Microwave Research Institute, Polytechnic Institute of Brooklyn.*
22. The application of the reaction concept to cavities and waveguides — Robert G. KOUYOUMIJIAN, *The Electrical Engineering Department, The Ohio State University, Columbus, Chio.*
23. On the attenuation of guided waves in the limit of high frequencies — Charles H. PAPAS, *California Institute of Technology, Pasadena, California.*
24. Forward scattering (electromagnetic) — D. M. RAYBIN, T. B. A. Senior, K. M. SIEGEL, S. STONE, H. WEIL, *The University of Michigan.*
25. Fock theory applied to an infinite cone — R. F. GOODRICH, *The University of Michigan.*
26. Back scattering from an infinite cone — Joseph B. KELLER, *Institute of Mathematical Sciences, New York University.*

27. Measurement of back scattering cross section of circular metallic disks with a space-separation method — Hans J. SCHMITT, *Gordon McKay Laboratory, Harvard University.*

28. Diffraction by a smooth object — Bertram LEVY, *Institute of Mathematical Sciences, New York University.*

29. Diffraction by an imperfectly conducting wedge — T. B. A. SENIOR, *The University of Michigan.*

Summaries of the papers are available at the General Secretariat of U.R.S.I. or at the Secretariat of the U.S.A. National Committee : U.S.A. National Committee of U.R.S.I., National Research Council, 2101 *Constitution Avenue N. W., Washington* 25, *D. C.*

U. S. S. R.

A. S. POPOV'S GOLD MEDAL

The Academy of Sciences of the U. S. S. R. announces the contest for A. S. Popov's Gold Medal awarded for distinguished scientific works and inventions in the field of radioengineering performed during the period from 1956 to 1958.

The medal may be awarded either to the Soviet or foreign scientists.

The papers may be presented in any language by scientific societies, research and educational institutes, governement departments, various organizations or by individuals in three typed or printed copies.

The organization presenting the work should accompany it by a testimonial of the scientific value and the importance of this work for the progress of radioengineering and also by a brief biography of the author with a list of his main scientific papers and inventions.

The final date of presentation — February, 1, 1959. The papers with the inscription « For the A. S. Popov's Medal contest » should be addressed to the Scientific Council on Radiophysics and Radioengineering of the Academy of Sciences of the U. S. S. R., Moscow K-9, Mokhovaya II.

COMMISSIONS

Official Members

APPOINTED BY THE HELLENIC NATIONAL COMMITTEE

Commission I : Mr. Jean KAFFEDJAKIS, Ingénieur en Chef de la Radiodiffusion Hellénique.

Commission II : Mr. le Professeur L. CARAPIPERIS, Professeur de Météorologie à l'Université d'Athènes.

Commission III : Mr. ANASTASSIADÈS, Professeur de Physique Electronique à l'Université d'Athènes.

Commission IV : Mr. L. CARAPIPERIS.

Commission V : Mr. ANASTASSIADÈS.

Commission VI : Mr. B. ASLANIDÈS, Directeur des Services Techniques de la Radiodiffusion Hellénique.

Commission VII : Mr. Anas. LELAKIS, Chef de la Section Radio du Ministère des Télécommunications.

COMMISSION III — ERRATUM

The name and address of the Official Member of Yugoslavia mentioned in Bulletin n° 106, p. 22, should read : Dr. Ing. Dejan BAJIC, Institut « Nikola Tesla », Belgrade, Boîte Postale 906.

COMMISSION VI — ERRATUM

The name and address of the Official Member of Yugoslavia mentioned in Bulletin n° 106, p. 28, should read : Ing. Mirjan GRUDEN, Professeur de la Faculté d'Electrotechnique, Aškerćeva cesta 11, Ljubljana.

Commission I

On Radio Measurements and Standards

STANDARD FREQUENCIES

(Reprint from *Journal UIT*, July 1958, nº 7)

In accordance with the Atlantic City Regulations the carrier frequencies of all British Broadcasting Corporation short-wave transmitters are maintained to within ± 30 parts in 10^6, but in practice they rarely exceed the limits of ± 10 parts in 10^6.

For some years three short-wave transmitters, GRO (6180 Mc/s), GSB (9510 Mc/s) and GSV (17 810 Mc/s) and the 200 kc/s Droitwich transmitter have been guaranteed to have a stability of better than 1 part in 10^6 (sub-standard carrier).

From 1 May, 1958, the three short-wave transmitters are no longer being maintained as sub-standard carriers. It is stated that this has been done to « provide for greater flexibility in the use of these frequencies between the overseas service transmitting stations ».

The 200 kc/s transmission, which incidentally is used by the BBC to control the carriers of a number of low-powered unattended transmitters in the United Kingdom of Great Britain and Northern Ireland, will continue to be maintained as a sub-standard carrier.

(Source : *Wireless World*).

Commission II

On Radio and Troposphere

SCATTER CIRCUITS

(Reprint from *Journal UIT*, July 1958, nº 7)

The United States Air Force plans installation in the next two years of 8000 additional route miles of ionospheric and tropospheric scatter circuits, mostly in the Arctic and sub-Artic regions where low and high frequency radio are subject to auroral interruption.

Decision to expand the present system of 8500 miles of tropospheric and 8700 miles of ionospheric circuits, built at cost of 234 000 000 dollars was taken on the basis of success with the present systems. It was estimated that the tropospheric system between St-Johns (Newfoundland) and Baffin Island, installed at cost of $ 40 000 000 had saved $ 20 000 000 compared with a conventional line-of-sight microwave system of 50 stations.

In Alaska, the Air Force is also installing a communication system of 23 tropospheric scatter links and eight microwave links covering 3000 route miles.

(Source : *Wire and Radio Communications*).

INVESTIGATION OF THE USE OF TROPOSPHERIC SCATTER AND METEOR BURST TO FILL COMMUNICATIONS

(Reprint from *Journal UIT*, July 1958, nº 7)

In an address to the New-York Chapter of the Armed Forces Communications and Electronics Association, Rear Admiral H. C. Burton, Director of Naval Communications of the United States of America declared that navy communications requirements in the nuclear and space age are resulting in the accelerated introduction of single sideband equipment into the fleet and the investigation of the use of tropospheric scatter and meteor burst propagation for ship-to-shore and ship-to-ship communications.

The Navy has « great hopes for meteor scatter as a means of solving some of the ship/shore communications problems », Admiral Burton said. « Indications are that this mode of transmission is reasonably free of the effects of ionospheric disturbances that result in complete radio propagation blackouts sometimes encountered with some other modes of radiocommunications ». He added that meteor burst systems also appear feasible for shipboard installation. Naval radiocommunications, in being or under development run the gamut of the frequency spectrum from the very low frequency of about 15 kc/s to the extremely high frequencies measured in kilomegacycles per second.

Distances involved range from a few miles to thousands of miles. Actually, planning for the future includes communications

circuits over a path length of almost half a million miles, using the moon as a passive relay.

(Source : *Industrial Communications*).

Commission III

On Ionospheric Radio

IONOSPHERIC SOUNDINGS

We want to draw the attention of our readers to the NBS Report 5587 « Early results from the equatorial close spaced chain of ionospheric vertical sounding stations » by R. W. Knecht and D. W. Schlitt.

RELATION BETWEEN VIRTUAL AND ACTUAL HEIGHTS IN THE IONOSPHERE

G. A. M. King

Geophysical Observatory, Christchurch, New Zealand

(*Journal of Atmospheric and Terrestrial Physics*, 1957, vol. 11, pp. 209-222)

Abstract. — There are two general methods of deducing the « true » heights from the virtual height-frequency curve.

Aspects of the comparison method treated are choice of model, effect of the earth's magnetic field, the meaning of total electron content, and the use of *hp* and M 3000 as height indicators.

The integral method is discussed from the viewpoints of the derived curve and the step-by-step procedure. There is a brief treatment of the nominal accuracy of reduction, sections on the importance of the earth's magnetic field and on « valleys » between layers, and a discussion of factors affecting the actual accuracy of analysis.

There are five current research projects at Christchurch based on true height analysis.

The bibliography is divided up according to subject, and there are notes on the references.

Commission IV

On Radio Noise of Terrestrial Origin

OBSERVATIONS OF THE WAVEFORMS OF ATMOSPHERICS

Recommendations of Commission IV have on several occasions referred to the desirability of observing at several stations the waveforms of the atmospherics from a single lightning flash, in order that the relative importance of the source and the propagation effects can be ascertained. It was decided that a special effort should be made during the International Geophysical Year to record a selection of waveforms in this way at a number of stations in Europe, and to provide means whereby their place to origin could be accurately known. A number of experiments have been performed, and a fuller programme is being arranged for the months of July and August when thunderstorms are most prevalent in Europe.

Under the existing arrangements, waveforms are recorded at stations in the United Kingdom, Germany and France, together with a timing signal, derived locally, which is accurate to the order of a second. Atmospheric noise in a narrow band at 10 kc/s is also recorded continuously as an aid in the identification of particular atmospherics. Bearings of the atmospherics are recorded photographically at three of the United Kingdom stations of the Meteorological Office, and also at the Radio Research Station, Slough, where they are coupled with records of 10 kc/s narrow band noise and accurate timing marks. At this station, therefore, there are time-correlated records of 10 kc/s noise, similar to those at the waveform stations, and directional traces similar to those at the meteorological stations.

If a waveform worker requires a fix on the source of a particular atmospheric which he can identify on his 10 kc/s noise record, this information is available from analysis of all the directional records which are collected at Slough. Since it is desired to pay special attention to those waveforms which have been recorded simultaneously at all stations, the requests are co-ordinated at the Cavendish Laboratory, Cambridge, which is one of the waveform stations.

The planned programme is to observe from 1520 to 1530 and from 2120 to 2130 GMT on the following dates : July 17, 24 and 31 ; August 7, 14, 21 and 28, 1958. Depending on the results of these observations, further programmes may be arranged. Observers are invited to contact Dr. Wormell at Cavendish Laboratory, Cambridge, U. K.

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

MEETINGS HELD IN BOULDER

Two meetings of the U.R.S.I.-A.G.I. Committee (Chairman Sir Edward Appleton) were held at Boulder (on 29th August and 3rd September, 1957).

1. — PUBLICATION

(i) *Publications concerned with I.G.Y. Radio Studies*

(see also minute 3 below)

The Committee agreed that a policy of undirected publication of I.G.Y. results should be encouraged. It would appear that publication of I.G.Y. radio studies could be considered in three categories :

(*a*) The planning activities — these were contained in the reports on the proceedings of the U.R.S.I.-A.G.I. Committee and had been published in the *U.R.S.I. Information Bulletin.* It was agreed that, for record purposes, these might be reprinted in the appropriate volume of the C.S.A.G.I. Annals of the I.G.Y.

(*b*) Publication of volumes of selected ionospheric data — The Committee noted that a preliminary proposal for printing about three volumes of basic ionospheric data had been made by the C.S.A.G.I. Working Group of Ionospheric Data Centres and agreed to endorse this proposal.

(*c*) Publication of « Interpretative Volumes » — The Committee agreed to sponsor the preparation by suitable authors, within a period of about three years after the conclusion of the I.G.Y. of volumes of an interpretative character in which a connected survey might be given of published I.G.Y. results in the radio field.

(ii) *Bibliography of I.G.Y. Radio Publications*

The Committee discussed the question of U.R.S.I. preparing and publishing a Bibliography of I.G.Y. Radio Publications but it was felt that this would be adequately covered by the C.S.A.G.I. Publications Committee and no further action was taken.

(iii) *Report on I.G.Y. Day Meetings during the U.R.S.I. Assembly*

The Chairman reported on the great success of the meeting on the I.G.Y. held at Boulder on 27th August and the Committee agreed to recommend to the Executive Committee that the morning proceedings of this meeting be published in the Proceedings of the XIIth General Assembly.

2. — U.R.S.I. World Wide Vertical Soundings Sub-Committee

The Chairman of this Committee (Mr. A. H. Shapley) reported on the recent activities of this Sub-Committee. It was stressed that during the I.G.Y. in order to safeguard the homogeneity of ionospheric data, it is essential for the World Wide Soundings Committee to maintain direct contact with operating stations and it was agreed for the duration of the I.G.Y. National Committees should be urged to permit such direct contact.

It was brought to the notice of the Committee that certain I.G.Y. ionospheric stations are not operating according to the agreed plan and the U.R.S.I.-A.G.I. Committee agreed, as a matter of urgency, to call the attention of National Committees to the need for ensuring that all stations are placed in full operation as soon as possible.

It was agreed that the World-Wide Soundings Sub-Committee should continue in being until the reconstitution of U.R.S.I. Sub-Commission IIIA, probably at the next U.R.S.I. Assembly. It was further agreed that the membership of the Sub-Committee, should consist of National Committee nominees, that powers of cooption should be given to the Chairman and that it should have an Executive Committee with the following membership : Shapley, Rawer, Aono, Piggott, Turner, Mednikova.

3. — Co-operation in certain I.G.Y. Ionospheric Studies

The question of U.R.S.I. support for groups of I.G.Y. workers wishing to co-operate in certain studies (e.g. ionospheric drift measurements) was discussed and it was agreed that the U.R.S.I.-A.G.I. Committee should encourage such co-operation. Furthermore, should any difficulties arise over the publication of the results of such co-operative studies, then the Committee agreed to recommend that U.R.S.I. should publish these results in the form of an U.R.S.I. Special Report.

4. — U.R.S.I. Compendium of Ionospheric Stations

The Secretary reported on the present position of this volume and it was agreed that publication should be pressed forward as early as possible. It was suggested that at a later date, information on magnetic dip at altitudes of 100, 200 and 300 km should be included in the Compendium but that publication should not be delayed on this account.

5. — I.G.Y. Research Scholarships

The Committee discussed the possibility of Educational Trusts and Foundations establishing I.G.Y. Scholarships to enable workers to undertake the analysis of I.G.Y. data. The following recommendation was adopted by the Committee :

« The U.R.S.I.-A.G.I. Committee is well aware of the plans already formulated in many institutions throughout the world for the scientific elucidation of I.G.Y. radio observations by way of theoretical study. Nevertheless, in view of the vast and unique opportunity for geophysical comprehension which such observations provide, the Committee invites all bodies which sponsor scientific research to consider the possibility of instituting special I.G.Y. Fellowships and Studentships — of all ranges of seniority, from professorial downwards — for the prosecution of such theoretical research in I.G.Y. World Data Centres, Universities and similar institutions on an individual or group basis. »

The Committee warmly commends the action of Unesco in instituting special studentships for the operational phase of the I. G. Y., and trusts that the same body will continue to support

individual scholars, in the same way, during the post-I.G.Y. stages of scientific elucidation.

6. — I.G.Y. Terminating Committee

The Committee received the I.C.S.U. proposals for establishing a Terminating Committee for the International Geophysical Year. This Terminating Committee will come into being on the dissolution of the C.S.A.G.I. Secretariat in July 1959. The Committee agreed to recommend to the U.R.S.I. Executive Committee that Dr. W. J. G. Beynon be the U.R.S.I. representative on this Terminating Committee.

7. — Future of U.R.S.I.-A.G.I. Commitee

It was agreed that the U.R.S.I.-A.G.I. Committee should continue in being to deal with all radio matters pertaining to I.G.Y. studies and the subsequent analysis of results. The next meeting will be held in Brussels in July 1958. The following revised membership was proposed and subsequently endorsed by the U.R.S.I. General Assembly :

Chairman : Sir Edward Appleton.

Vice-Chairman : Dr. L. V. Berkner.

Members : Dr. H. G. Booker, (*) Dr. N. Pushkov, (*) Dr. Fukushima, Dr. W. Dieminger, (*) Dr. R. L. Smith-Rose, Mr. J. A. Ratcliffe, Mr. A. H. Shapley, (*) Dr. Slutz, Dr. D. F. Martyn, Dr. Nicolet, Father P. Lejay, Mr. D. Lepechinsky, Colonel E. Herbays, Dr. W. J. G. Beynon (Secretary).

In proposing this revised membership the Committee has in mind the future greater relative importance of the World Data Centres and accordingly the names marked with an asterisk are proposed as representatives of the four World Data Centres.

W. J. G. Beynon
Secretary.

World-Wide Soundings Committee

MEMORANDUM 17 — FUTURE WORK

Most committee members and consultants have responded in one form or another to Memo 16. I am attaching, as annex 1, comments taken from the replies of Piggott, Beagley, R. Wright, Mednikova, and Meek. Also attached, as annex 2, is a summary of the information taken from the Soundings Questionnaires that have been returned. Some details having to do with the program differences between stations in the various networks were necessarily omitted because of space limitations.

It is generally accepted that in the immediate future the work of our Committee should fall into the following categories :

(*a*) Monitoring of the ionospheric soundings data to assess the degree of homogeneity and the accuracy of the observations.

(*b*) Discussion of the plans of the various administrations regarding post-I.G.Y. networks of sounding stations and the formulation of appropriate recommendations in this regard.

In connection with the monitoring of the current I.G.Y. soundings program, the question of the advisability of the general circulation of the Soundings Questionaire is pertinent. The preliminary summary, attached, reflects the program at about 65 stations — about 1/3 of the world-wide I.G.Y. network. It seems to me that it would be worthwhile to circulate the Questionnaire to all stations and, on the basis of the returns, prepare a station-by-station table summarizing the information in a form similar to the attached table. This information could be of great value to researchers and others working in our field. I should like your views on this point and also any recommendations as to changes or additions to the Questionaire.

On the question of the post-I.G.Y. soundings network plans of the various groups, very little information has been generally available as yet. I think we could at least get started on this if each of you would include in your next communication a paragraph on your own post-I.G.Y. planning — which, if any, stations known to you will close on January, 1, 1959 ; which will continue

some additional months ; which will continue indefinitely. I know in the case of the U. S. network, these things are just now under discussion but since some of our final decisions may be interdependent, circulation of preliminary thinking might be profitable.

Reviewing our Second Report I find that several jobs we planned have not yet been done. They are (1) the preparation of a brief summary of the decisions and recommendations of the First and Second Reports in the form of instructions to operators and (2) an annex (perhaps combined with (1)) to the I.G.Y. Vertical Soundings Manual containing the revisions in the soundings work adopted by our Committee. I still feel that a concise report on the recommendations of our First and Second Reports is needed but because the observational phase of I.G.Y. is already two-thirds over, I think we should slant such a document at the researcher who is, or shortly will be, using the I.G.Y. data. Further, it seems very reasonable to include in this report, the station-by-station summary table mentioned above. Distribution of the report could be accomplished by having it printed in the *U.R.S.I. Information Bulletin.*

Several of the committees and consultants have written in favor of a meeting this summer : several other consultants, however, have not thought the need so urgent. It seems to me on further reflection that a general gathering of the whole group is not practical in these busy times. I will be attending both the U.R.S.I.-A.G.I. Committee meeting in Edinburgh, July 21 to 23 and the C.S.A.G.I. meeting in Moscow, July 29 to August 9. I will plan to assemble any of our group who are attending these other meetings and to have discussions of our work. I would like to encourage members and consultants to meet informally as opportunity arises and provide combined contributions to our work for circulation by mail.

I would appreciate comments on the points raised in this memorandum from both members and consultants.

Sincerely yours,

A. H. Shapley,

A. H. Shapley, Chairman,
U.R.S.I.-A.G.I. World-Wide Soundings Committee.

To : *Members of Committee* :

Y. Aono,
N. Mednikova,
W. Piggott,
K. Rawer,
A. Shapley (*Chairman*),
J. Turner.

Principal Consultants :

P. Herrinck, A. Haubert, J. Beagley, J. Meek, A. Mitra, W. Baker, R. Knecht, R. Rivault, W. Becker, R. Wright, K. Davies, S. Fujiki, A. Lyon, O. Sandoz.

Annex I

(1) Extract of letter from Madame N. V. Mednikova dated 19 April, 1958

I was very glad to receive after so long interval your Memorandum No 16, in which you concerned the important questions on the future work of the world-wide network of ionospheric stations, and also of our Committee's work.

I asked the chairman of the working group on the ionosphere at U. S. S. R. - I.G.Y. Committee to discuss the question on the past-I.G.Y. network of stations as well as the recommendations of the ad hoc U.R.S.I. sub-committee that studied this question during the XII-th General Assembly.

The meeting of our working group will take place at the end of April and after that I shall be able to send you the adopted decision on this question.

The Nizmir staff members began to visit the ionospheric stations in U. S. S. R. with the aim to assist in maintaining the desired degree of uniformity of procedures and interpretation.

I agree with all decisions of W.W.S.C. adopted at its last meeting in Boulder.

A partial meeting this summer of members and consultants of our Committee will be of course very desirable. I hope that you would be so kind as to inform Dr. Pushkov and me about the data and place.

(2) Extract of letter from W. R. Piggott dated 14 April, 1958

I agree with the clarifying remarks worked out at Boulder and feel that they will help the stations.

It might be worth while discussing the E*s* median problem raised by Rawer and also the question of whether the omission of occasions marked B seriously modify the interpretation of *f*min medians at high latitude stations.

An interesting point which has arisen here is that it is often possible to measure the 3000 km MUF with the transmission curve even when the critical frequency is too diffuse to permit measuring *fo*F2 and the factor. Such information is very valuable for practical prediction work and also throws some light on the behaviour of the main reflecting layer. It might be worth while to encourage a few stations to make such measurements as a special I.G.Y. experiment.

I feel that a meeting of the group in Europe would be advantageous and that it should be held as early as possible since otherwise it is unlikely that any conclusions or recommendations could be fully circulated in time to be effective.

I enclose your questionnaire marked according to the practice at the majority of our stations. The Royal Society Station at Halley Bay has carried out a more extensive programme approximating to that recommended for a slow ionosonde at high latitudes. Only short periods at continuous recording have been practical there owing to interference with other work at the base.

I feel that the committee should prepare a short memorandum summarising the points which will need further attention and recommending the maintenance of at least a skeleton network of stations after the I.G.Y. I think that we must realise that policy decisions will be made not only on the maintenance of special I.G.Y. stations but also on the question of which and how many pre-I.G.Y. stations should be continued.

A case could be made out to maintain certain long established stations purely on the advantages of very long sequences of observations from one point and a case for certain new stations on the grounds that we have insufficient data from them to establish the solar cycle variations. It would be helpful to the committee to have some indication of the probable policy of the administrations so that serious gaps do not develop. At the present moment we propose to close Inverness but maintain Slough, Singapore, Port Stanley, Port Lockroy until further notice. The future

of these stations is, however, subject to review after the end of the I.G.Y.

Our policy has been to conform to the recommendations of the committee as far as possible but our facilities have not allowed the full programme to be operated.

We are making special observations at Slough particularly on accurate E heights, and E*s*. Selected sequences of records from our stations are also being reduced to give ionisation-height profiles and these will be circulated in due course as part of our I.G.Y. effort. We are proposing to do some of the additional work suggested by the committee using selected data when it is clear which periods are likely to be most generally valuable.

I believe that a number of stations may be obtaining more data than can be worked out. It might be worth while for the committee to designate certain periods for special study so as to increase the available data for these periods.

(3) Extract of letter from J. W. Beagley, dated 1 May, 1958

I am returning to you, the Vertical Soundings Questionnaire covering the stations in our network and hope that it proves useful to the W.W.S.C.

1. A. (1) There has been no confusion here and frankly I can see no reason why concern should have been expressed.

(2) We agree with this suggestion but feel that symbol N should be included with (S, C, R, etc).

*fo*E*s*, *fb*E*s* > *fo*E*s* because of N
e.g. D 3.5 N

(3) This is the practice adopted here.

B. (2) The system of publishing representative, unusual etc. ionograms, already is being undertaken here. Our system is to publish these in the data booklets for each station. The idea is excellent and has proved most helpful in our experience.

C. I feel that the W.W.S.C. or an equivalent organisation (an *active* one !) should continue to function after the I.G.Y. A great

deal of progress has been made during the last two years in the operation of ionosondes and interpretation of ionograms — mainly from the W.W.S.C. and its adjuncts. This should continue if our work is to be of any value for practical and research purposes.

(4) Extract of letter from R. W. H. Wright, dated 31 March, 1958

I am in general agreement with all the points in the memorandum. With regard to point C discussed at Boulder, it would seem to me that a committee with consultants as provided by the W.W.S.C. forms a very useful link between ionospheric stations and networks, and not only should it continue as a monitoring group, but attempts should be made to retain it in some form or other after the I.G.Y.

(5) Extract of letter from J. H. Meek, dated 2 April, 1958

Post-I.G.Y. Network of Stations

The ionospheric net was designed for and has to date produced only « climatological » information on the ionosphere. The major defect of this net is that it will never, with its present and proposed distribution and the agreed scaling and tabulating rules, produce a system of ionospheric forecasting which will tell the communications officer what frequency to use for a given circuit at a given hour of a given day. This has resulted in undue lack of confidence in the possibilities of HF communications on the part of military and other users who require high reliability. It has meant low priority for further work in this field.

To overcome the problem a great effort must be made to study the differential parameters of the ionosphere and the localized anomalies. The present world-wide net will not allow this. We must start with a closely spaced, well chosen localized net. The sounding program need not and probably should not be vertical incidence sounders of the orthodox type. A simple data gathering and reduction system is required.

An extensive program must be carried out on oblique measurements to relate vertical incidence patterns to practical communications circuit limitations. In this respect we have not advanced

since Newbern Smith's work of about 1935. A number of oblique circuits have been operating in the past few years but apart from the work now going on at DRTE (Ottawa-Slough) there seems to be no serious effort to study oblique data in relation to communication circuits, vertical incidence data and predictions.

In the near future from a « climatological » point of view I see a requirement for fewer ionospheric stations. Many can be dropped after I.G.Y. Relatively few inaccessible spots are yet to be sampled.

If work goes ahead on synoptic ionospheric forecasting (of which detailed disturbance forecasting is an extreme case) and suitable working rules are evolved I can see a requirement for a greatly expanded network of VI and absorption stations of a very simplified type. A few parameters being read off a dial or counter by the local postmaster or met. observer. The density of stations required, of course, is not as great for meteorological observation but is greater than exists in the present ionospheric net.

Annex 2 — SUMMARY OF INFORMATION RETURNED ON SOUNDINGS QUESTIONNAIRE (as of 13 June, 1958)

	A	B	C	D	E	F	G	H	I
1. *Schedules* :									
(*a*) Soundings at least every 15 minutes on ordinary days	N	Y	N	Y	N	Y	N	Y	Y
(*b*) Soundings at least every 5 minutes on RWD-SWI	N	Y	N	Y	N	N	N	Y	Y
(*c*) Schedule is	X[1]	—	X[1]	—	X[1]	X[11]	X[1]	—	—
2. *Presentation of Data* :									
(*a*) *f*-plots prepared daily	N	Y	N	Y	N	X[12]	N	N	X[20]
(*b*) *f*-plots prepared only for RWD and SWI	Y	—	Y	—	Y	Y	Y	Y	Y
(*c*) *f*-plots not prepared	—	—	—	—	—	—	—	—	—
3. (*a*) *fo*F2, (M 3000) F2, *h'*F2, *fo*F1, (M3000) F1, *h'*F,	Y	Y	Y	Y	Y	Y	Y	Y	Y
*fo*E, *h'*E, *fo*E*s*, *h'*E*s*, *fb*E*s*, type E*s*, *f*-min.	N	X[3]	X[7]	X[8]	X[10]	N	X[15]	X[17]	N
4. Accuracy :									
(*a*) F region virtual heights to nearest 5 km	Y	Y	Y	Y	Y	X[13]	Y	Y	Y
(*b*) E region virtual heights to nearest 2 km	N	X[4]	N	N	N	N	N	Y	Y
(*c*) E region virtual heights to nearest 5 km	Y	Y	Y	Y	Y	X[14]	Y	—	—
(*d*) F region critical frequencies to nearest 1 Mc	Y	X[5]	Y	Y	Y	Y	Y	Y	Y
(*e*) Regular E region critical frequencies to nearest 0.05 Mc	Y	X[6]	Y	Y	Y	Y	Y	Y	Y
(*f*) Regular E region critical frequencies to nearest 0.1 Mc	—	Y	—	—	—	—	—	—	—
(*g*) M factors to nearest 0.05 of a unit	Y	Y	Y	Y	Y	Y	Y	Y	Y
(*h*) M factors to nearest 0.1 of a unit	—	—	—	—	—	—	—	—	—
5. *Letter Usage* :									
(*a*) Consistent with First and Second Report of WWSC	Y	Y	Y	Y	Y	Y	Y	Y	Y
6. *Additional Work at Stations* :									
(*a*) *h'*-plots	N	Y	Y	Y	N	N	N	N	N
(*b*) E-plots	N	N	N	Y	N	N	N	N	N
(*c*) Continuous runs (movies) taken	X[2]	N	N	Y	N	N	Y	Y	X[21]
(*d*) True height data scaled	—	Y	Y	—	—	—	—	—	Y
(*e*) Other	—	—	—	X[9]	—	—	X[16]	X[18]	—
7. *Visits to Stations* :									
(*a*) Regular program in operation	N	N	—	Y	—	Y	N	N	Y

KEY

Y : Yes N : No X : See numbered footnote

A : United Kingdom (PIGGOTT).
B : N. Z. (BEAGLEY).
C : Ibadan (LYON).
D : Japan (AONO).
E : Rabat (HAUBERT).
F : Australia (TURNER).
G : France (RIVAULT).
H : Breisach (RAWER).
I : U. S. (KNECHT).

Footnotes :

X^1 : Ordinary days 60 minutes : RWD and SWI 15 minutes.
X^2 : Short periods at Halley Bay.
X^3 : *fo*E2, *fx*F2, F*z*F2, *fx*E, *fz*E, on first RWD each month, at least.
X^4 : Only at Cape Hallett.
X^5 : 0.1 Mc up to 10 Mc, then 1 % thereafter (Godley Head, Raratonga, Scott Base).
X^6 : Only at Cape Hallett.
X^7 : *hm* F2 (by kelso method).
X^8 : *hp*F2, Y*p*F2 (at Kokubunji).
X^9 : Continuous recording of envelopes of critical frequency and minimum virtual height for E and F layers : RWD, SWI, Alerts at Kokubunji.
X^{10} : *hp*F2, *h'*F2, *fo*E2.
X^{11} : Soundings every 10 minutes on RWD-SWI.
X^{12} : Daily *f*-plots at Mawson and Macquarie.
X^{13} : F region virtual heights scaled to nearest 10 km.
X^{14} : E region virtual heights scaled to nearest 10 km.
X^{15} : F1.5 scaled.
X^{16} : Absorption program at Bangui, Tamanrasset, Tahiti, Djibouti, Dakar, Kerguelen ; Ionospheric winds measured at Bangui, Tamanrasset, Tahiti.
X^{17} : Analysis of F2, 3000, MUF (quarter-hourly).
X^{18} : Under discussion.
X^{20} : At all stations except Maui, Puerto Rico, Panama, Stanford.
X^{21} : As interference problems permit, on RWD-SWI.

C. C. I. R.

Documents received at the General Secretariat

(See *Information Bulletin*, nº 109, p. 30)

STUDY GROUP Nº V ON TROPOSPHERIC PROPAGATION

V/5. — United Kingdom : Propagation data required for wide-band radio systems.

V/6. — United Kingdom : Advantages to be obtained from consideration of polarisation in the planning of broadcasting services in the VHF (metric) and UHF (decimetric) bands.

V/7. — United Kingdom : Tropospheric propagation curves for distances well beyond the horizon.

V/8. — Netherlands : Tropospheric propagation curves for distances well beyond the horizon.

V/9. — United Kingdom : Tropospheric wave propagation.

V/10. — United Kingdom : Tropospheric propagation across mountain ridges.

V/11. — United Kingdom : Radio transmission utilising inhomogeneities in the troposphere (commonly called « scattering »).

V/12. — United States of America : Advantages to be obtained from consideration of polarization in the planning of broadcasting services in the VHF (metric) and UHF (decimetric) bands (Television and sound).

V/13. — United States of America : Measurement of field strength for VHF (metric) and UHF (decimetric) broadcast services, including television.

V/14. — United States of America — Description of coverage for VHF (metric) and UHF (decimetric) broadcast services, including television.

V/15. — United States of America : Proposed report on field strength measurements.

V/16. — Netherlands : TV-transmitter (band V) measurements.

V/17. — Netherlands : Field strength measurements on 433 Mc/s at distances well beyond the horizon.

STUDY GROUP VII ON STANDARD-FREQUENCIES AND TIME SIGNALS

VII/1. — German Federal Republic : Standard frequency transmissions and Time Signals in additional frequency bands.

VII/2. — United States of America : Stability of standard-frequency transmissions and time signals as received.

VII/3. — German Federal Republic : Stability of standard-frequency transmissions and time signals as received.

VII/4. — International Time Bureau : Standard-frequency transmissions and time signals.

VII/5. — Japan : Report on standard-frequency transmissions and time signals.

VII/6. — France : Use of special modulation on the standard-frequency transmissions for assessing the reliability of propagation forecasts.

VII/7. — People's Republic of Poland : Reception of time signals and standard-frequencies.

VII/8. — France : Standard-frequency and time signal transmissions.

VII/9. — France : Standard-frequency and time signal transmissions.

VII/10. — France : Stability of standard-frequency and time signal transmission at reception.

VII/11. — France : Standard-frequency and time signal transmissions in new frequency bands.

VII/12. — U.R.S.I. : Commission I on Radio Measurement and Standards Resolution n° 2.

VII/13. — Czechoslovakia : Standard-frequency transmissions and time signals.

VII/14. — Czechoslovakia : Standard-frequency transmissions and time signals on frequencies below 100 kc/s.

VII/15. — United States of America : Frequency and time determination at WWVH.

VII/16. — Netherlands : Standard-frequency transmissions and time signals.

VII/17. — Italy : Improvement of I.B.F. standard-frequency and time signal transmissions.

INTERNATIONAL GEOPHYSICAL YEAR

I.G.Y. News

Total Solar Eclipse: 12 October 1958

(Extracts from *U. S. I.G.Y. Bulletin*, nº 12)

The total eclipse of the sun due on 12 October 1958, occurs at an extremely opportune time for solar studies ; the solar physics studies of the I.G.Y. will provide an abundance of data on the sun for long periods before and after the eclipse. It also occurs near a period of maximum solar activity, the most active solar maximum in recorded history. September and October 1957, on the basis of preliminary reports, had the highest sunspot numbers ever recorded. At the time of the eclipse the sun should still be very active.

Observational program : The Technical Panel on Solar Activity of the US National Committee for the I.G.Y. is taking full advantage of this favorable situation and has organised an extremely broad observational program. Six teams of US scientists will travel to the Danger Islands, an atoll in the South Pacific also known as Pukapuka after the largest island in the group ; there they will mount four ground-based optical experiments, one rocket experiment and one ground-based electronic experiment. Preparations for these experiments have been underway since before the beginning of the I.G.Y. in July 1957.

Existing weather records indicate a 40 % chance that clouds will obscure the sun during the critical period of totality, but cloud conditions will impede only the optical experiments. No matter what the weather, the electronic experiment and the rocket observations will go forward and should obtain extremely valuable data on solar radiation and associated ionospheric effects.

The institutions participating in the expedition are the Naval Research Laboratory, the Central Radio Propagation Laboratory of the National Bureau of Standards, the University of Wisconsin,

the California Academy of Sciences, the US Naval Radiological Defence Laboratory, the Sacramento Peak Observatory and the High Altitude Observatory.

Logistic Problems : The main problem facing the planners of the expedition has been the selection of a suitable piece of land on which to erect the observational instruments. The path of totality begins at sunrise approximately on the equator at about 158° E and ends at sunset at a point inland from Santiago, Chile. The path misses all the large Pacific Islands, and observations from Chile would be impractical because of the low altitude of the sun at the time of the eclipse. The only dry land from which observations would be profitable are coral islands too small to support a large expedition comfortably.

The logistic problem has been solved with the help of the Navy, which is furnishing the U.S.S. Thomaston, a Landing Ship Dock (LSD), to serve as transportation, floating hotel and warehouse for the period the expedition is at the Danger Island site. The expedition plans to arrive at the Danger Islands about 1 September and leave on 1 November. Except for a period of one week during which the Thomaston will travel to Samoa to refuel, all personnel will live aboard the ship. They will be ferried by boat and helicopter to and from the observational site on the most southerly island of the group, Mote Koe.

Since the Thomaston is much too large to enter the lagoon of the atoll by the only passage, and the anchorage is not possible outside the atoll, the LSD must steam back and forth in the open ocean two or three miles from the outer reefs to maintain position.

(The article includes details of the electronic and optical experiments. It also records details of expeditions by other countries : The Japanese plan an extensive series of observations from a base on Suwarrow (Suvarov) Island, several hundred miles from the Danger Islands. The U. S. S. R. has indicated that it will send an expedition but has not designated a site. New Zealand will establish a base at Atofu).

Issue of 2nd 6-month Catalogues of I.G.Y. Data. Vth C.S.A.G.I. Meeting

The 2nd 6-Monthly Catalogues of I.G.Y. Data at WDCs were collated and distributed on 2nd July by Coordinator to C.S.A.G.I.,

I.G.Y. Participating Committees, WDCs and Permanent Services. A set, complete for all disciplines, will be distributed at the Vth C.S.A.G.I. Meeting in Moscow to C.S.A.G.I. and A.C.I.G.Y. delegates. It will be Document N° 5.

In the catalogue for Ionosphere V p. 5, there have been omitted in error the Australian Stations C964 Adelaide, C918 Brisbane, B977 Hobart and A961 Macqurie Is which have sent data in Whistlers to WDCs A, B and C2. Data cover first three months of I.G.Y. except Adelaide's which is for third month only.

Other documents prepared by Coordinator for distribution to all participants in the Vth C.S.A.G.I. Meeting are N° 6 « Flow of Data from stations to WDCs »; and N° 7 « WDC Matters ».

The C.S.A.G.I. Guide to I.G.Y. WDCs will not have appeared in I.G.Y. Annals by the time of the Meeting. A small number of the English abridged edition, corrected to date, will be available for reference.

BIBLIOGRAPHY

International Electrotechnical Commission

Third Supplement to Publication nº 61. — International Recommendations regarding Lamp Caps and Holders together with Gauges for the Control of Interchangeability.

Publication nº 65, *amendment* 1, 1958. — Safety Requirements for Electric Mains Operated Radio Receiving Apparatus.

Publication nº 101, *first edition.* — Rules for auxiliary machines on motor vehicles (electric motors and generators).

Publication nº 102, *first edition.* — Rules for the electric transmission of vehicles with Diesel engines (main d. c. motors and generators).

These publications are on sale at the Central Office of the I.E.C., at the price of Sw. Fr. 3.—, per copy, plus postage, for Third Supplement to Publication nº 61 ; Sw. Fr. 2.—, per copy, plus postage, for Publication nº 65, amendment 1 ; Sw. Fr. 6.—, per copy, plus postage, for Publication nº 101 and Sw. Fr. 7.50 per copy, plus postage, for Publication nº 102.