# The IXth Plenary Assembly of the International Radio Consultative Committee (CCIR)

*(Los Angeles, 2-29 April, 1959)*

*(Concluded)* [1]

**Study Group VI — Ionospheric propagation**

Chairman : Dr. D. K. Bailey (United States of America)

Vice-Chairman : Dr. E. K. Smith (United States of America)

At Warsaw, SG VI had set up a special working party to study various methods of evaluating sky-wave field strength on frequencies above 1.5 Mc/s. This working party, under the chairmanship of Mr. Lépéchinsky (France), met several times ; its work was resumed at Los Angeles and culminated in different texts, including a Report and a Recommendation, which outline a systematic programme of measurements of ground-wave field strength between 1.5 and 40 Mc/s. The working party observed that it had a limited number of valid measurement results at its disposal, and a new Study Programme was issued in this connection.

SG VI amended the Recommendations on the exchange of observations for the establishment of short-term predictions and on basic predictions.

A revised edition of the Warsaw Report on Atmospheric Noise was published, while a Recommendation provides for a working party to revise the Report, and a new Study Programme was prepared on man-made radio noise measurements.

The protection of frequencies used in radioastronomy is dealt with in a revised Recommendation, which requests protection of deuterium, hydrogen, and ion H lines as well as a number of bands above 30 Mc/s.

A new Recommendation defines the expressions " classical MUF ", " standard MUF " and " operational MUF. "

A number of other subjects, which were under study following the Warsaw Assembly, are dealt with in reports summarizing the results obtained until the Plenary Assembly and in new Study Programmes which were revised in accordance with these results. Some of these subjects are

precursors indicative of short-term variations of propagation conditions

propagation on frequencies below 1.5 Mc/s

propagation and absorption between 1.5 and 40 Mc/s

intermittent communication by meteor-burst propagation

ionospheric scatter

fading

basic predictions

choice of a basic index for ionospheric propagation

pulse-transmission at oblique incidence.

Two new reports have been prepared, on the whistler mode of propagation and on back-scatter, respectively.

Finally, the Plenary Assembly passed a Resolution requesting the working party on local lightning flash counters to continue its studies.

**Study Group VII — Standard frequencies and time signals**

Chairman : Mr. B. Decaux (France)

Vice-Chairman : Prof. M. Boella (Italy)

As at Warsaw, SG VII prepared a Recommendation on the general problem of standard-frequency transmissions and time signals. The main amendment concerns the accuracy required, which is stricter than the Warsaw provision, particularly for transmitted frequencies.

The data on the various standard-frequency transmissions and time signals are again assembled in a table, which has been brought up to date. It shows how the number of stations in all parts of the world is constantly increasing.

SG VII has issued two new Recommendations on subjects already under study : one relates to standard-frequency transmissions in additional frequency bands and particularly in band 4 (myriametric waves), where a 100 c/s band is desired in the neighbourhood of 20 kc/s. The broadcasting of such transmissions over transmitters on bands 5, 6 and 8 is also advocated.

Another Recommendation suggests means of eliminating interference caused by standard-frequency transmissions in the bands allocated to that service.

The programme of SG VII for forthcoming years mentions, with some changes, the subjects dealt with at Warsaw. In addition, it is requested, in collaboration with SG VI, to study frequency staggering from the point of view of propagation.

Finally, a new programme of studies concerns the transmission spectrum for high-precision time signals.

[1] *Telecommunication Journal*, December, 1959, page 259*e*.

### Study Group VIII — International monitoring

Chairman : Mr. J. D. CAMPBELL (Australia)

Vice-Chairman : Mr. G. S. TURNER (United States of America)

(In the absence of Mr. Campbell, Mr. TURNER took the Chair.)

At the IXth Plenary Assembly, SG VIII amended its Recommendation on the accuracy of frequency measurements at monitoring stations so as to provide a greater number of classes of measurements, including measurements above 50 Mc/s.

Two new reports furnish additional information on the automatic monitoring of spectrum occupancy —a subject already dealt with in a Warsaw Recommendation—and on spectrum measurement.

In response to a question raised at Warsaw, a new report gives details regarding measurements at mobile monitoring stations, while another report describes the contributions submitted on field-strength measurements at such stations.

The Recommendation on the identification of radio stations was also amended. A summary of the contributions received in this respect appears in a report, and the relevant question was modified accordingly.

Most of the Warsaw texts are to be found in the working programme of SG VIII. In addition, some entirely new questions are being studied concerning monitoring at fixed stations of transmissions from space vehicles, the measurement of *S*-values and its correlation with field strength, the identification of interference to reception by means of a " catalogue " listing all types of radiated interference observed and, finally, the visual monitoring of the spectrum.

### Study Group IX — Radio relay systems

Chairman : Mr. W. J. BRAY (United Kingdom of Great Britain and Northern Ireland)

Vice-Chairman : Mr. G. PEDERSEN (Denmark)

In the interval between the Warsaw and Los Angeles meetings, SG IX proceeded steadily with the task of standardization, the broad lines of which had been prepared at its interim meeting in 1954. In addition to the interim meeting held at Geneva in 1958, a joint CCITT-CCIR working party on circuit noise met twice prior to the Los Angeles Assembly.

The outcome of this study group's work at Los Angeles was a more or less complete revision of all the texts for which it is responsible. It is impossible here to give even a brief analysis thereof. Suffice it to say that, as far as radio relay systems using time-division multiplex are concerned, it was not considered feasible to undertake more extensive standardization, since instances of international interconnection using this procedure will be comparatively rare. Further information on this matter is given in a report.

All the study group's work on standardization has been concentrated on radio relay systems using frequency-division multiplex. The Recommendations issued cover the following main points : interconnection at audio frequencies in the baseband or video band and at intermediate frequencies, frequency deviation and pre-emphasis, channel arrangements for different capacities and bands, hypothetical reference circuits, circuit noise, maintenance, pilots, service channels, performance measurements.

These subjects have also been developed in some CCIR reports.

Other reports deal with the computation of noise due to non-linearity and noise from the point of view of voice-frequency telegraph transmission.

Finally, the more recent Question of radio relay systems using scatter is covered by a Recommendation and two reports ; these refer almost exclusively to tropospheric scatter, as SG IX considers ionospheric scatter systems incapable, for the time being, of satisfactory transmission performance.

The future working programme of SG IX has not undergone any appreciable change in its broad lines, the questions being drafted in sufficiently wide terms to cover the subject as a whole. New Study Programmes, however, involve more specialized subjects, such as radio relay systems of more than 1800 channels, transmission over several modulated channels simultaneously with television transmission, characteristics of auxiliary radio relay systems for the provision of service channels and radio-frequency channel arrangements in radio relay systems using tropospheric scatter propagation.

### Study Group X — Broadcasting

Chairman : Mr. A. P. WALKER (United States of America)

Vice-Chairman : Mr. K. W. MILLER (United States of America)

The work of SG X may be divided into two parts : low frequencies (recording) and radio frequencies.

Magnetic tape recording is mentioned in a new Recommendation. The principal amendments concern the maximum bandwith, which is increased from 6.30 to 6.35 mm, and certain specifications for hubs and spools.

The Recommendation regarding disc recording has been cancelled, while a Resolution recommends that, for information on recording characteristics, reference should be made to the appropriate publication of the International Electrotechnical Commission.

A new Recommendation deals with television recording, the picture being recorded optically on 16 or 35 mm film and the sound being recorded in the form of one or more optical or magnetic tracks on the same or on separate film.

Other low-frequency subjects were tackled ; some of which gave rise to reports (measurement of programme level and of wow in recording).

SG X has thoroughly reviewed the programmes of new subjects for study, amending previous Questions

and setting new ones ; the following new studies are to be undertaken : measurement of programme level, measurement of audio noise, simultaneous transmission of two sound channels in television and, above all, stereophonic broadcasting. The last-named subject had already been made the subject of a question set at the request of numerous Administrations prior to the Los Angeles conference. This Question was revised in accordance with information received, and divided into three texts relating stereophonic broadcasting and recording.

There are two new Recommendations on broadcasting proper : one on the effects of different spacings between carrier frequencies on high-frequency protection ratios and another on frequency-modulation broadcasting ; the latter specifies the field-strength values producing acceptable quality and protection ratios.

New studies are requested on high-frequency broadcasting concerning the effects of different spacings between carrier frequencies and of propagation path length and direction on protection ratios. Further new studies are requested on long- and medium-wave broadcasting (bandwith, transmission performance) and on compatible single-sideband transmission.

### Study Group XI — Television

Chairman : Mr. E. ESPING (Sweden)
Vice-Chairman : Mr. G. HANSEN (Belgium)

Some purely technical subjects have produced new results : for example, one Recommendation accepts phase pre-correction on transmission, while some corrections have been made in the text on television signal-to-noise ratios. A report was issued on orthogonal wave polarization differentiation ; an additional differentiation of 18 db is now accepted on VHF and UHF waves. A report provides documentation on the assessment of the quality of television pictures.

As at previous meetings, the most important study for SG XI concerns television standards.

As regards black-and-white television, a report summarizes the standards for the various systems in use at the time of the Plenary Assembly.

SG XI paid particular attention to standards for Bands IV and V, this problem being very important for colour television. The present-day aspects of this problem are summarized in a report, which suggests, *inter alia*, that in the interest of standardization the spacing between channels should be increased from 7 to 8 Mc/s. As regards the standards for colour television, a number of Administrations have tested a system in which the sub-carrier is placed in the brightness band ; a value of 4.43 Mc/s has been considered for this sub-carrier.

A sub-group met recently in Geneva to study the best use to be made of the 8 Mc/s channel for a 625-line television system.

The programme of work for SG XI remains unchanged since Warsaw ; i.e. it still covers a wide range of subjects.

### Study Group XII — Tropical broadcasting

Chairman : Dr. M. B. SARWATE (India)
Vice-Chairman : ————

SG XII drafted several new reports at Los Angeles. One report shows variations as a function of time and variations of the minimum signal frequency required for reception. Another report deals with the analysis of fading.

A further report discusses methods for calculating the field strength produced by a tropical broadcasting transmitter ; three methods are summarized and graphs illustrate the influence of various factors.

The last of these reports relates to interference in the bands shared with broadcasting. Two series of tests recently carried out on protection ratios are described and the protection ratios obtained so far from different sources are summarized in a graph.

Very little change has been made in the programme of studies for SG XII, except as regards the programme concerning interference in the bands shared with broadcasting which now specifies the various provisions required to obtain protection ratios.

### Study Group XIII — Mobile services

Chairman : Mr. J. D. H. VAN DER TOORN (Netherlands)
Vice-Chairman : Mr. J. SØBERG (Norway)

(In view of Mr. van der Toorn's recent resignation, Mr. SØBERG took the Chair.)

The new Recommendations issued by SG XIII relate mainly to the maritime mobile services.

On VHF waves, the spacing between carrier frequencies at transmission and reception has been increased to 4.6 Mc/s to avoid interference due to the product of intermodulation between picture and sound transmissions at certain television stations.

The Question of selective calling devices for use in the international maritime mobile radiotelephone service was also considered ; another Recommendation specifies the characteristics of single-sideband radiotelephone transmissions for the aeronautical and maritime mobile services.

No significant change has been made in the Study Programme for SG XIII. A new Resolution advises Administrations to consult with each other in case of difficulty or when joint land mobile services are set up and to notify the technical characteristics applicable in their respective countries to these services.

Finally, a new Question relates to direction finding in the 2 Mc/s band.

### Study Group XIV — Vocabulary

Chairman : Mr. R. VILLENEUVE (France)
Vice-Chairman : ————

SG XIV issued a new Recommendation on the designation of frequency bands. As was proposed at

the London Assembly, the designation of these bands by numbers has been retained ; the expression Hertz (Hz), however, has been introduced to designate, along with c/s, the frequency unit.

As regards vocabulary, definitions of certain basic terms to be found in the Radio Regulations are proposed in a report.

There is a new Resolution giving fresh directives for the preparation of a Radio Vocabulary and outlining a procedure based on the work of active collaborators in the work of this study group ; these collaborators are to be appointed by the various CCIR study groups and will ensure liaison between these study groups and SG XIV.

## Changes made in the CCIR Study Groups

As at Warsaw, some amendments were made in the terms of reference of the study groups. As a result of resignations in the interval between the VIIIth and IXth Plenary Assemblies, many of the chairmen and vice-chairmen have also been changed.

The principal amendments in terms of reference concern two of the study groups on propagation (IV and V). The former terms of reference of SG IV (Ground-wave propagation) and SG V (Tropospheric propagation) have been merged in the present terms of reference for SG V, while the new SG IV has been requested to study all communication problems affecting space vehicles.

The following is an up-to-date list of the terms of reference for the CCIR study groups and the names of their Chairmen and Vice-Chairmen.

### Study Group I
### (Transmitters)

*Terms of reference*

1. To make specific studies and proposals in connection with radio transmitters and generally to summarize and coordinate proposals for the rational and economic use of the radio spectrum.
2. To study a number of problems concerning telegraphy and telephony from the transmission point of view.
3. To study spurious radiation from medical, scientific and industrial installations.

Chairman : Colonel J. LOCHARD (France)
Vice-Chairman : Professor S. RYŹKO (P. R. of Poland)

### Study Group II
### (Receivers)

*Terms of reference*

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

Chairman : Mr. P. DAVID (France)
Vice-Chairman : Mr. Y. PLACE (France)

### Study Group III
### (Fixed Service Systems)

*Terms of reference*

1. To study questions relating to complete systems for the fixed and allied services and terminal equipment associated therewith (excluding radio-relay systems). Systems using the so-called ionospheric-scatter mode of propagation, even when working on frequencies above 30 Mc/s, are included.
2. To study the practical application of communication theory.

Chairman : Dr. H. C. A. VAN DUUREN (Netherlands)
Vice-Chairman : Dr. S. NAMBA (Japan)

### Study Group IV
### (Space systems)

*Terms of reference*

To study technical questions regarding systems of telecommunication with and between locations in space.

Chairman : Professor I. RANZI (Italy)
Vice-Chairman : Dr. W. KLEIN (Switzerland)

### Study Group V
### (Propagation, including the effects of the earth and the troposphere)

*Terms of reference*

To study the propagation of radio waves over the surface of the earth, taking into account changes in the electrical constants of the earth and irregularities of terrain, and including the effects of the troposphere.

Chairman : Dr. R. L. SMITH-ROSE, C.B.E. (United Kingdom)
Vice-Chairman : Dr. A. KALININ (USSR)

### Study Group VI
### (Ionospheric propagation)

*Terms of reference*

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

Chairman : Dr. D. K. BAILEY (USA)
Vice-Chairman : Dr. E. K. SMITH (USA)

### Study Group VII
### (Standard-frequencies and time signals)

*Terms of reference*

Organization of a world-wide service of standard-frequency and time-signal transmissions. Improvement of measurement accuracy.

Chairman : Mr. B. DECAUX (France)
Vice-Chairman : Professor M. BOELLA (Italy)

### Study Group VIII
### (International monitoring)

*Terms of reference*

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

radio-frequency emissions. Examples of such measurements are : frequency, field-strength, bandwidth, etc.

Chairman : Mr. J. D. CAMPBELL (Australia)

Vice-Chairman : Mr. G. S. TURNER (USA)

### Study Group IX
### (Radio-relay systems)

*Terms of reference*

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

Chairman : Mr. W. J. BRAY (United Kingdom)

Vice-Chairman : Mr. E. DIETRICH (Federal Republic of Germany)

### Study Group X
### (Broadcasting)

*Terms of reference*

To study the technical aspects of transmission and reception in the sound broadcasting service (except for tropical broadcasting), including standards of sound recording and sound reproduction to facilitate the international exchange of programmes ; to study also the technical aspects of video recording in liaison with Study Group XI.

Chairman : Mr. A. PROSE WALKER (USA)

Vice-Chairman : Dr. H. RINDFLEISCH (Federal Republic of Germany)

### Study Group XI
### (Television)

*Terms of reference*

Technical aspects of television.

Chairman : Mr. E. ESPING (Sweden)

Vice-Chairman : Mr. G. HANSEN (Belgium)

### Study Group XII
### (Tropical broadcasting)

*Terms of reference*

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

Chairman : Dr. M. B. SARWATE (India)

Vice-Chairman : Mr. A. C. RAMCHAMDANI, M.Sc. (Tech.) (India)

### Study Group XIII
### (Mobile services)

*Terms of reference*

To study technical questions regarding the aeronautical, maritime, land mobile and radio location and navigation services, and miscellaneous operating questions of concern to several services.

Chairman : Mr. G. H. M. GLEADLE (United Kingdom)

Vice-Chairman : Mr. J. SØBERG (Norway)

### Study Group XIV
### (Vocabulary)

*Terms of reference*

To study, in collaboration with the other Study Groups and, if necessary, with the CCITT, the radio aspect of the following : vocabulary of terms and list of definitions, lists of letter and graphical symbols and other means of expression, systematic classification, measurement units, etc.

Chairman : Mr. R. VILLENEUVE (France)

Vice-Chairman : Mr. A. FERRARI-TONIOLO (Italy)

## The work of the special committees

### a) Drafting Committee

In accordance with a well-established procedure within the CCIR, the Drafting Committee examined the texts emanating from the study groups from an editorial point of view. It has, in fact, been our experience that a uniform presentation greatly facilitates the work of the plenary sessions, which have to reach a final decision on these texts.

Although the task of this Committee is therefore essentially editorial, it would be erroneous to conclude that its work is simple. This is indeed far from the case, as the texts reaching the Drafting Committee have been drawn up in fourteen different study Groups, and sometimes by the other special committees, so that a considerable effort is involved, particularly if the volume of work is of the order of 900 pages of documentation in each language, as was the case in Los Angeles.

The Drafting Committee also made proposals for a new lay-out of the volumes to be published after the conclusion of the Los Angeles Plenary Assembly, the main purpose being to group texts of a similar nature.

### b) Organization Committee

This Committee dealt particularly with matters concerning the activities of the CCIR and its Secretariat between Plenary Assemblies. Thus, on the one hand, it provided a new Resolution (No. 67), concerning the organization of the work of the CCIR between assemblies, which replaces Resolution No. 36 of Warsaw on the same subject. On the other hand, taking the proposals of the Drafting Committee into account, it came to the conclusion that the up-to-then single volume of findings of the Plenary Assembly should be split into three parts, as it had become too large for convenient consultation.

It also made proposals to the Plenary Assembly relative to the terms of reference of the study groups.

### c) Technical Assistance Committee

This Committee discussed the ways and means to extend participation of the CCIR in the Technical Assistance programme, as there is little doubt that this part of the tasks of International Organizations is becoming ever more extensive. However, it appeared that there were severe limitations of a financial nature

on the possibilities under the present structure of the Union.

**d) Finance Committee**

The Finance Committee considered in the first instance the Agreement between the inviting Administration and the CCIR, concerning the arrangements for the IXth Plenary Assembly, and in particular the financial implication thereof.

It also presented its views to the Plenary Assembly on those sections of the Director's Report, relating to the financial needs of the CCIR in the years 1960, 1961 and 1962.

## Administrative remarks

As mentioned previously in this article, the VIIIth Plenary Assembly of the CCIR in Warsaw drew up Resolution No. 36, which was intended to decrease the amount of documentation to be considered at the study group meetings held in conjunction with the Plenary Assembly, as in Warsaw it became evident that it was no longer possible to give thorough attention, in the time available, to the ever-increasing number of papers presented.

To this end it was decided that an effort should be made to spread the work-load more evenly, by means of holding interim Study Group meetings in the period between Plenary Assemblies. Such meetings would then be able to prepare new texts or modifications to existing ones, on the basis of contributions to their work, thus facilitating the task of the Plenary Assembly. It was also felt that study groups which did not hold interim meetings should nevertheless proceed, through their Chairmen, in the same manner.

To give effect to this Resolution, nine CCIR Study Groups held interim meetings in the course of 1958, and the findings of these meetings were sent as annexes to the respective Chairmen's reports to the participants in the IXth Plenary Assembly. The net result was that the number of pages of preparatory documentation to be considered in Los Angeles *decreased by 57%* while, at the same time, the volume of the texts considered by the Drafting Committee was *slightly more than double* that of Warsaw.

While this result is in itself quite satisfactory, as it achieved to some extent the purposes of the VIIIth Plenary Assembly, it might nevertheless be noted that a large number of contributions were still received in Los Angeles, while the Chairmen of the study groups which had not held meetings were not in a position to submit proposals, so that the documentation of these study groups had also to be considered *in toto*.

The Los Angeles Plenary Assembly, recognizing that there was still room for improvement, therefore revised Resolution No. 36, on a proposal of the Organization Committee, as referred to above, with the aim of making more effective the procedure instituted at Warsaw.

It might be noted in this connection that, while the number of items for *study* (i.e. Questions, Study Programmes and Resolutions) has increased continuously from Plenary Assembly to Plenary Assembly, the number of texts representing the *findings* of the Plenary Assembly (i.e. Recommendations and Reports) has increased even faster. This phenomenon may be considered as gratifying, particularly the increase in the number of Reports as, while they do not represent definite conclusions, they nevertheless give the results of experiments and measurements undertaken in many countries, and may therefore be considered as a useful contribution by the CCIR to Technical Assistance.

At its final session, the Plenary Assembly accepted by acclamation the invitation from the Government of India to hold its Xth meeting in New Delhi. It also expressed very eloquently its appreciation of the great skill with which Dr. Lebel had let its debates.

In conclusion, it should be recorded here that every effort was made by the US Government to make the meeting the success it was. In particular, most suitable premises were made available free of charge, thus considerably reducing the financial burden of the ITU. Nor should the numerous excursions and other entertainments, arranged both by official and private authorities, be forgotten, for these events were an integral part of the success of the meeting.