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INTERNATIONAL
TELEGRAPH CONSULTATIVE COMMITTEE

(C. C. I. T.)

DOCUMENTS

OF THE
SIXTH MEETING

AT BRUSSELS

10th—27th May, 1948

(GENEVA REVISION)

March 1951

INTERNATIONAL TELECOMMUNICATION UNION

OCTOBER 1951



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EXTRACTS FROM THE MINUTES

OF THE FINAL PLENARY SESSION

27th May, 1948

.....
Collection of contributions.

On the subject of contributions for the general expenses connected with the present Meeting, the Chairman proposed to request the Bureau of the Union to make the usual arrangements for the collection of subscriptions, on the basis of the decisions of the Organization Committee to the effect that, for the purposes of the present Meeting, the following Administrations and private enterprises should be asked to contribute.

a) Administrations and private operating agencies affiliated to the C. C. I. T., and represented at the Brussels Meeting :

South Africa
Argentine Republic
Austria (Commonwealth of)
Austria
Belgium
Bulgaria
China
Denmark
Finland
France
Italy
Luxembourg
Netherlands
Norway
Poland
Portugal

Roumania
United Kingdom
Sweden
Switzerland
Czechoslovakia
Cable and Wireless Ltd.
Compagnie générale de télégraphie
sans fil
Companhia Portuguesa Radio
Marconi
Italcable
Grande Compagnie des
télégraphes du Nord
Radio-Austria
Transradio Internacional
Buenos Aires

b) Administrations affiliated to the C. C. I. T., but not represented at the Brussels Meeting :

Egypt
Hungary
India
U. S. S. R.

c) Administrations and private operating agencies not affiliated to the C. C. I. T., but represented at Brussels :

Brazil
Canada
Dominican Republic

Liberia

American Cable & Radio Corporation System Companies

Mackay Radio and Telegraph Company

Western Union Telegraph Company

R. C. A. Communications, Incorporated.

d) Administrations not affiliated to the C. C. I. T., represented at the Brussels Meeting and which had expressed a wish to share in the expenses of the Meeting :

United States of America

e) *Special Cases.* Germany, Japan and Spain, affiliated to the C. C. I. T., were unable, for different reasons, to be represented at the Meeting.

It was decided that these three countries should not contribute to the expenses of the Meeting.

The *Secretary General* stated that the four Companies referred to under c) above had not yet indicated choice of class for contribution in conformity with the communication from the Bureau of the Union which appeared in Notification No. 548 dated 1st April, 1948. He requested the Companies concerned to be good enough to give the Bureau of the Union the required information as soon as possible.

Publication of Documents.

The *Chairman* said that, in connection with the publication of the documents of the VIth Meeting, Committee O had declared the view that it was advisable to make the following arrangements :

- a) A record of the Plenary Meeting, comprising the minutes of the opening and closing sessions, the series of Recommendations issued by the C. C. I. T., the list of questions for study, the composition of the Study Groups and a list of all documents circulated before and during the Meeting, to be issued as a service document of the International Telecommunication Union;
- b) documents circulated before and during the VIth Meeting of the Plenary Assembly shall, so far as supplies permit, be issued to Members of the Union on request.

The *Assembly* agreed.

Composition of Study Groups.

The *Chairman* said that it was customary at the last Plenary Assembly to appoint the countries which were to participate in the studies of the different Study Groups; but in consideration of the fact that from 1949 onwards the C. C. I. T. would include a large number of countries not represented at the present Meeting, he suggested that the *Secretary-General* of the Union should be entrusted with the task of asking the different Administrations to make known in which Groups they wished to participate.

The *United Kingdom* Delegate pointed out that there would be a certain difficulty in choosing the countries, which would have to appoint the Group Chairmen. The *Assembly*, on the proposal of the *Italian* Delegation decided to proceed immediately to the appointment of those countries represented at Brussels which wished to participate in the work of the different Study Groups. The countries which were to provide the Group Chairmen would be appointed at the same time, on the understanding that any Administration not represented at Brussels, which wished to participate in the studies of the C. C. I. T. from 1st January, 1949 onwards, would merely have to send in its name in due course.

The *Chairman* proceeded to take the names of countries desiring to participate in the different Study Groups, and the *Assembly* appointed the countries which were to provide Principal Rapporteurs.

The Study Groups to be composed as follows :

<i>Group</i>	<i>Participating countries</i>	<i>Countries to provide Group Chairmen</i>
1 :	Brazil, United States, France, Italy, Poland, United Kingdom	Italy
2 :	France, Italy, Netherlands, Poland, Portugal, United Kingdom, Sweden	Netherlands
3 :	Austria, Denmark, United States, France, Italy, Netherlands, Poland, Portugal, United Kingdom, Czechoslovakia	France
4 :	United States, France, Italy, United Kingdom	United Kingdom
6 :	Argentine, Austria, France, Italy, Portugal, United Kingdom, Sweden	France
7 :	Austria, Denmark, France, Italy, Netherlands, Poland, United Kingdom, Czechoslovakia	United Kingdom
8 :	Austria, Denmark, France, Italy, Netherlands, Poland, Roumania, United Kingdom, Switzerland, Czechoslovakia	Czechoslovakia
9 :	Argentine, Canada, United States, France, Italy, Netherlands, Poland, Portugal, United Kingdom, Sweden, Switzerland, Czechoslovakia	Portugal
10 :	Denmark, United States, France, Italy, Netherlands, Poland, Portugal, Roumania, United Kingdom, Sweden, Switzerland, Czechoslovakia	Italy
11 :	Austria, Belgium, Denmark, United States, France, Italy, Luxembourg, Norway, Netherlands, Poland, United Kingdom, Switzerland, Czechoslovakia	Netherlands

For Study Group 5 France alone gave in its name. The Swedish Delegation was not prepared to provide the Chairman for this Group on the ground that, as the Swedish Administration was concerned with questions relating to protection in the C. C. I. F., it could not usefully participate in studies on the same question in the C. C. I. T.

The *Secretary-General* observed that in the C. C. I. T. of 1949 a large number of extra-European Administrations would be interested in questions relating to the protection of telegraph lines, especially overhead lines liable to be disturbed by power line circuits now in process of development. He concluded that Group 5 should be retained. The work which it would be called upon to do would undoubtedly prove to be of great interest.

Finally, the *Chairman* proposed to entrust the Bureau of the Union with the task of consulting Administrations on membership of Study Group 5 and the appointment of its Group Chairman.

Agreed.

Next Meeting of the C. C. I. T.

The *Chairman* announced that the Netherlands Administration was prepared to assume the duty of organizing the next Meeting of the Plenary Assembly of the C. C. I. T. in 1951.

He proposed that the Assembly should ratify this choice, and he warmly thanked the Netherlands Delegation for its acceptance of the task.

The *Assembly* signified its approval by warm applause.

.....

POSTPONEMENT UNTIL 1953 OF THE NEXT C. C. I. T. PLENARY MEETING AND PROVISIONAL ARRANGEMENT TO PREVENT DELAY IN THE WORK FO THE C. C. I. T.

Circular telegram No. 8/147 (11 October 1950) :

147/11. First 44 members union have approved administrative council proposal to postpone telegraph and telephone conference until 1954. No country opposed postponement second 36 members union of whom 15 participate in work of C. C. I. T. have approved administrative council proposal to postpone C. C. I. T. plenary assembly until 1953. 7 members opposed postponement. Therefore telegraph and telephone conference is postponed until 1954 and C. C. I. T. plenary assembly is postponed until 1953. To enable you to assess situation exactly copies of replies received from administrations follow shortly = Secretary General +

*Extract from the Report by the Interim Director of the C. C. I. T. to the Sixth Session of the
Administrative Council and approved by the Administrative Council*

By circular telegram No. 147/11 of 11 October 1950 the Administrations of the Union were informed that as a result of the consultation undertaken during the Fifth Session of the Council the next meeting of the Plenary Assembly was postponed until 1953. In circular letter No. 9.4/81 of the General Secretariat dated 14 November Administrations were acquainted with the view of the Council that postponement of the meeting of the Plenary Assembly should in no way prevent the Study Groups from pursuing their work, that there should be consultation by correspondence and that the Interim Director could organize, with the Group Chairmen concerned, joint meetings of several Study Groups. The results of the postponement were developed in the subsequent C. C. I. T. circular letter No. 10/50 dated 22 November which set out plans for future meetings, described procedure for approval of provisional recommendations (avis) of the Study Groups and explained that the Interim Director will be unable to observe the provisions of paragraph 6 of Chapter 14 of the General Regulations, which lay down that the estimates of expenditure of a C. C. I. shall be approved by the Plenary Assembly for each of the next two years, he will, until 1953, have to go direct to the Administrative Council for credits (both ordinary and extraordinary) required to maintain the activities of the C. C. I. T.

The sub-committee for Telegraph Maintenance met at Geneva from 2 to 7 October 1950, at the same time as the sub-committee for Telephone Maintenance. As a result C. C. I. F. recommendations relating to voice frequency telegraph circuits were revised. The sub-committee also prepared ten draft recommendations which are at present submitted to examination by other Study Groups of the C. C. I. T.

Study Group No. XI (International service of telegraph subscribers), met from 2 to 11 November 1950 and new draft regulations for the Telex service and several draft recommendations were submitted to administrations participating in the work of the C. C. I. T.

Study Groups Nos. I, II, III, IV, VI, VII, IX, X and XI met in Geneva, from 5 to 22 March 1951.

In general, the difficulties arising from the decision to postpone the Plenary Assembly until 1953 were overcome. However, it was evident that the Interim Director required precise instructions on the handling of the recommendations made by the Study Groups, and the Principal Rapporteurs agreed on the procedure given in Annex 2 to this document.

It was requested that certain draft recommendations should be forwarded to administrations for their comments. It will be necessary to await the latter before deciding whether the Study

Groups concerned need meet, prior to the meeting of the Plenary Assembly, to discuss any necessary amendments to these recommendations. Should this be necessary, credits for such meetings will have to be provided but, for the time being, I have no suggestion to make concerning an increase of the credits already provided in the extraordinary budget of the C. C. I. T.

Some Study Groups have submitted new questions for study before 1953. These questions will be submitted to the Council in another document.

As regards the Telegraph Regulations, Study Group X restricted itself to proposing that the provisions of three chapters of the Regulations should be regrouped. In accordance with Resolution 7 annexed to the said Regulations, the Secretary General will be requested to distribute to all administrations the full texts, as regrouped by the Study Group, to serve as a basis for proposals to the next Telegraph and Telephone Conference. The Administrative Council is requested to consider whether the cost of the document should be attributed to the extraordinary budget of the said Conference.

Furthermore, the provisional recommendations issued will supplement or modify some of the Brussels recommendations. It would undoubtedly be of great advantage for administrations to have a complete collection of all the modifications to the Brussels document (new provisional recommendations, modified recommendations, new questions for study). I intend to publish this collection towards the end of 1951.

H. Townshend,
Interim Director.

*Annex 2 to the Report of the Interim Director of the C. C. I. T.
Treatment of C. C. I. T. recommendations during the interim period*

At the meeting of Group Chairmen held on 19 March 1951, it was decided that the Recommendations proposed by Study Groups of the C. C. I. T. should be divided into three classes as follows :

- A. *Provisional Recommendations* which it is desired that Administrations should put into operation if they so desire. These shall be forwarded by the Interim Director to all Administrations of the Union for information.
- B. *Draft Recommendations* to be sent by the Interim Director, for comments to Administrations which have undertaken to pay a share of the extraordinary expenses of the C. C. I. T. as well as Administrations which have appointed a rapporteur to the Study Group concerned. The Study Group may, if it so desires, prescribe a wider consultation. The Interim Director shall ask the Administrations consulted to limit their remarks to questions of substance and to ensure that their replies are received within a period of three months.
- C. *Draft Recommendations* which remain to be further examined, before 1953, either by the Group concerned, by another Group or by another C. C. I.

It was also agreed that each Recommendation should bear an indication whether it is in class A, B or C.

It was further decided that Provisional Recommendations (class A above) should contain the formula : " The C. C. I. T. having considered declares the view ". Draft Recommendations (classes B and C above) would contain the formula " Study Group No. of the C. C. I. T. having considered declares the view ". Once a Draft Recommendation is agreed it would become a Provisional Recommendation and would bear the appropriate formula : " The C. C. I. T. having considered declares the view ".

This report has been approved by the Administrative Council on 4th May 1951 (see Document 915/AC 6).

C.C.I.T. RECOMMENDATIONS

(including Provisional Recommendations)

Note: 1. The numbers of the Provisional Recommendations since the Brussels Meeting are shown in brackets, followed by the provisional numbers allotted to them by the Study Groups.

2. Numbers of Recommendations appearing in the 1948 edition of the Brussels documents, which have been subsequently modified by a Provisional Recommendation, are preceded by an asterisk.

3. Numbers of Recommendations appearing in the 1948 edition of the Brussels documents, which have become obsolete since the Paris Conference, or which have been cancelled by a Provisional Recommendation, are preceded by two asterisks. The texts of such Recommendations do not appear in this document.

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II/2	368	III/2	671		
II/3	362				
II/4	363				
II/5	369	IV/1	582 and 681		
II/6	364	IV/2	583		
II/7	370	IV/3	584		
II/8	520	IV/4	588		
II/9	375	IV/5	681	X/1	875
II/10	531	IV/6	682	X/2	903
II/11	711			X/3	982
II/12	712			X/4	961
II/13	389				
II/14	557	VII/1	657		
II/15	519	VII/2	869		
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II/17	516			XI/2	862
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Recommendation No. 102. Additional rules of procedure for the C. C. I. T.

The C. C. I. T. adopts the following rules additional to the provisions of the General Regulations annexed to the International Telecommunication Convention of Atlantic City, 1947.

A. Plenary Assembly (A. P.)

1. *a)* The exact date of a meeting of the A. P. shall be fixed by the Inviting Government, in agreement with the Secretary-General of the Union, in accordance with the progress of the work of the Study Groups.

b) The Secretary-General of the Union, at the request of the Director of the C. C. I. T., shall transmit on behalf of the Inviting Government to all Members of the C. C. I. T., as provided for in Chapter 8, paragraphs 1, 2 and 3 of the General Regulations, the invitation to take part in the Meeting of the A. P.

c) The recipients of the invitations who wish to be represented at this Meeting must announce, by letter or telegram addressed to the Secretary-General, the names of the Delegates and Representatives respectively and, in particular, the Head of the Delegation, at least one month before the Meeting. The Secretary-General shall inform the Director.

2. The minutes of the meetings of the A. P. shall indicate the results of the vote without specifying which Delegations voted for or against. The corresponding Recommendations shall also specify the results in the following form :

The C. C. I. T. unanimously declares the view; or The C. C. I. T. declares the view (by a majority of votes against votes)

3. Before the closing session of the Meeting of the A. P., the Heads of Delegations shall meet :

a) to submit to the A. P. proposals for setting up Study Groups and for the designation of Group Chairmen;

b) to approve the Report concerning the activities of the Committee since the last Meeting of the A. P. and the Budget estimates prepared by the Director for each of the two following years.

4. At the closing session of the Meeting of the A. P., the Director shall furnish a Summary Report on the work of the A. P., specifying in particular the Recommendations adopted by the A. P. and the list of Questions the study of which is to be begun or continued by the various Study Groups. The A. P. at the same session shall draw up lists of the Administrations and private operating agencies taking part in the work of the various Study Groups. It shall also appoint by name a Group Chairman for each Study Group. It shall further appoint by name the Chairman and the five other members of the Budget Committee of the C. C. I. T.

B. The Director

1. The Director, who, by virtue of the provisions of Article 8, paragraph 4 *c)* of the International Telecommunication Convention of Atlantic City, is appointed by the A. P. for an indefinite period with the reciprocal right of terminating the appointment, is empowered to enter into direct contact with the Group Chairmen of the Study Groups.

2. In order to enable the Director to keep himself informed of technical developments, Administrations and private operating agencies shall afford him every facility for visiting their installations and shall furnish him with all necessary information. Expenditure thereby incurred shall be a charge on the C. C. I. T.

3. The Director, so far as he is concerned, shall take all necessary steps for the preparation of the meetings of the A. P. and Study Groups.

4. After the close of each meeting of the A. P., the Director shall transmit to all Administrations, private operating agencies and International Organizations admitted to the C. C. I. T., lists

of the questions the study of which is to be begun or continued by each Study Group, and shall request them to forward their comments, the results of their experiments, and the drafts of the replies they intend to make to the various questions. The Director shall send to all members of the Study Groups the complete preliminary documentation which he has received.

5. a) During the first quarter of every year, the Director shall prepare accounts for the previous year to 31st December, and shall communicate the same by letters to the members of the Budget Committee for audit and approval. After approval by the Budget Committee, the accounts shall be forwarded by the Director to the Secretary-General of the Union.

b) At least two months before a meeting of the A. P., the Director shall prepare budget estimates for the two years following such a meeting. He shall submit these estimates to the Budget Committee of the C. C. I. T. for preliminary examination. The Chairman of the Budget Committee shall prepare a report on the subject for the information of the Heads of Delegations at the next session of the A. P.

6. a) The expenditure of the current years shall be passed by the Director within the limits of the credits which are allotted to him by the Administrative Council. Within the limits authorized, the necessary sums shall be put at his disposal by the Secretary-General.

b) In the event of lack of funds during the period of transition from one financial period to another, or in order to meet unforeseen expenditure or expenditure in excess of budget estimates, the Director shall be empowered, subject to the approval of the Budget Committee, to approach the Administrative Council of the Union, through the intermediary of the Secretary-General of the Union, in order to obtain an advance of the necessary funds.

C. Study Groups

1. To facilitate their work, the number of Administrations and private operating agencies, members of any Study Group shall be as restricted as possible.

2. With a view to preparing a general plan of the meetings of the Study Groups (Chapter 13, paragraph 2, of the General Regulations annexed to the International Telecommunication Convention of Atlantic City), each Group Chairman shall notify the Director in due time of the number of days required for the work of his Study Group and, should it be his intention to hold joint meetings with one or more other Study Groups, the number of days required for this purpose.

3. a) No Minutes shall be kept of the meetings of Study Groups. Reports giving an account of the work of meetings of Study Groups must reach all Administrations and private operating agencies of the C. C. I. T. at least one month before the date of the next meeting of the A. P., since questions in respect of which no report has been furnished in this way cannot appear in the agenda of these meetings.

b) Administrations and private operating agencies are authorized to communicate the reports of Study Groups to any experts they consider it expedient to consult, except where the Study Group concerned has specifically decided that its report is to be treated as confidential.

4. a) All Study Groups shall meet simultaneously at the place where the Meeting of the A. P. is held, during the days immediately before the opening of the Session of the A. P., in order to decide on the final texts of the draft recommendations to be submitted for its approval.

b) The programme of all the meetings of Study Groups during the days immediately before the opening of the A. P. shall be communicated by the Director in due time to all Administrations and private operating agencies affiliated to the C. C. I. T. (whether or not members of the Study Groups concerned), to enable all members of the C. C. I. T. to be present at these meetings.

c) During the meeting of the A. P., all Study Groups shall hold themselves at its disposal in order to make any drafting amendments which it may propose in the texts of the draft recommendations.

**** Recommendation No. 111. Budget of the C. C. I. T. for the year 1949**

**** Recommendation No. 112. Expenses incurred by meetings
of the Study Groups of the C. C. I. T.**

*(See Resolution No. 19 annexed to the Telegraph Regulations-Paris Revision 1949-and the
Resolution No. 171 of the Administrative Council)*

Recommendation No. 121. Simultaneous interpretation

The C. C. I. T.,

considering

that simultaneous interpretation makes it possible to shorten debates but is not suitable for certain discussions on difficult points where, in particular, it is necessary to refer to new ideas involving the use of terms not yet well defined and where, consequently, the translation must be constantly watched by technical experts conversant with the problems studied,

unanimously declares the view

that in principle simultaneous interpretation should be used for Plenary Assemblies and for Study Groups in which a substantial number take part.

**Recommendation No. 151. Amalgamation of the Directives of the C. C. I. T.
and the C. C. I. F. with regard to the protection of telecommunication lines**

The C. C. I. T.,

considering

that in conformity with Recommendation No. 151 of the Plenary Assembly at Warsaw in 1936, the Directives relating to the protection of telegraph lines against disturbances due to electric traction lines and power lines have been amalgamated with the corresponding Directives of the C. C. I. F.;

that these common Directives have been elaborated by representatives of the C. C. I. T. and of the C. C. I. F. in the presence of representatives of the International Railway Union, the International Union of Producers and Distributors of Electric Energy, the International Conference of Main High Tension Electrical Networks and the International Electrotechnical Commission;

that in this amalgamation the interests of the C. C. I. T. have been safeguarded;

and that the Directives thus amalgamated contain data and conclusions which are most useful in estimating the disturbing influence of power lines on telegraph lines;

unanimously declares the view (19)

that the common publication thus drawn up and entitled "*Directives relating to the protection of telecommunication lines against harmful action of industrial electricity lines*" (Rome Edition 1937, revised at Oslo 1938) should be adopted by the C. C. I. T. to replace, in matters concerning the protection of telegraph lines, the Directives agreed on at Warsaw in 1936;

considering in addition

that it can be foreseen that in the near future, a revision of the aforementioned Directives so as to take account of new needs and recent technical developments, will prove useful;

and that the C. C. I. T. will have an interest in such revision;

unanimously declares the view (20)

that the Study Group of the C. C. I. T. occupied at the present time with questions of protection relating to telegraphy, should be assigned the task of participating in the said work of revision on the Joint Committee whose nomination for the purpose is awaited.

Note by the Permanent Secretariat of the C. C. I. T.: *The C. C. I. T. Study Groups charged to examine questions of protection have not been constituted.*

Recommendation No. 161. Relations between the C. C. I. T. and the C. M. I.

The C. C. I. T.,

considering

that, among the questions of protection relating to telegraphy, there are some whose study will require the carrying out of experiments involving the cooperation of electric traction organizations and of organizations for the production and distribution of electric energy;

that the International Joint Committee (C. M. I.) for experiments on the protection of telecommunication lines and of underground plant has been created to organize, carry out and give effect to such experiments in collaboration with the representatives of all interested organizations (telecommunication, electric traction, production and distribution of electric energy, etc.);

that the International Consultative Committees of the International Telecommunication Union are Members as of right of the C. M. I.;

unanimously declares the view

that the Study Groups set up by the Plenary Assemblies of the C. C. I. T. for the study of questions of protection relating to telegraphy should participate in the work of the First Section of the C. M. I., whose present Study Groups are the following :

- Study Group No. 1* Definition and measurement of the disturbing action of power lines.
- No. 2* Steps to be taken to reduce disturbance in telephone and telegraph lines due to arc converters (rectifiers, ondulators, converters).
- No. 3* Study of residual components in power and distribution networks.
- No. 4* Coexistence of D. C. or A. C. electrified railway lines with telecommunication lines.
- No. 5* Coexistence of electric power lines (with or without superposed high frequency communication circuit transmissions) with circuit carrier frequency telecommunication circuit.
- No. 6* Definition, measurement and admissible limits of noise induced in telephone lines.
- No. 7* Dissymmetry of telecommunication circuits.
- No. 8* Electromagnetic or electrostatic coupling between power and telecommunication lines.
- No. 9* Coexistence of high-tension D. C. power lines with telecommunication circuits.
- No. 10* Protection devices for line-staff or telecommunication plant against the dangers produced by electric power lines.

Note by the Permanent Secretariat of the C. C. I. T.: *The C. C. I. T. Study Groups charged to examine questions of protection have not been constituted.*

Recommendation No. 201. Publication of documents

The C. C. I. T.,

unanimously declares the view

1. that for the publication of documents of the VIth Meeting of the Plenary Assembly, the following steps should be taken :

- a) a record of the Plenary Meeting, comprising the minutes of the opening and closing sessions, the series of recommendations issued by the C. C. I. T., the list of the questions for study, the composition of the Study Groups, and a list of all the documents circulated before and during the Meeting shall be issued as a service document of the International Telecommunication Union;
- b) documents circulated before and during the VIth Meeting of the Plenary Assembly shall, so far as supplies permit, be issued to Members of the Union on request;

2. that, as regards the preparatory documents for the next meeting of the Plenary Assembly, the following steps should be taken :

- a) these documents shall include the replies from Administrations to the questionnaires addressed to them, technical correspondence between the Rapporteurs and the Group Chairmen (with the exception of any lists of documents or simple covering letters), the general reports issued by the Study Groups and any annexes or supplements;
- b) these shall be regarded as working documents, and shall be reproduced by the most economical process compatible with satisfactory legibility (particularly as regards formulae, diagrams, and photographs), to ensure that they can be easily kept and consulted;

3. that in the future, with a view to avoiding a fresh distribution of the preparatory documents of a meeting of the Plenary Assembly after the meeting in question and at the same time facilitating subsequent reference to any statements or memoranda contained therein which might be of particular interest for subsequent work of the C. C. I. T., the Study Groups should be requested to specify the extracts from the preparatory documents, which should be printed in their original language (French, English or Spanish) in a quarterly appendix to the "Telecommunication Journal".

Recommendation No. 212. Glossary of definitions. Telecommunication vocabulary

The C. C. I. T.,

considering

that for the successful conclusion of the studies entrusted to the C. C. I. T. it is useful to have precise terminology;

that a certain number of terms have already been defined in the official documents of the International Telecommunication Union and in the Recommendations of the C. C. I. T.;

that the development of telegraphy and the evolution of technique involve the use of new terms, the meaning of which must be clearly defined;

that further, the number of problems concerning equally the technique of telegraphy, telephony and radio tends to increase;

unanimously declares the view (10)

that it would be advantageous to set up, in co-operation with the C. C. I. F. and the C. C. I. R., a *Glossary of Definitions* of terms used specially in studies concerning telecommunication;

that it seems desirable, for the performance of this task, that each International Consultative Committee should undertake to draw up a list of the definitions relating to the particular technique

with which it deals, and that the work of standardizing these definitions should be entrusted to a *joint Study Group* ;

considering, further,

that under the title *Telecommunication Vocabulary*, the Plenary Assemblies of the Cairo Conferences decided to compile a standard multilingual glossary of terms used in studies concerning telecommunication ;

that the work of collating and perfecting definitions may be of interest for the preparation and keeping up to date of this *Telecommunication Vocabulary* ;

unanimously declares the view (2^o)

that the results of the study of the definitions might be brought periodically to the notice of the special Committee entrusted with the preparation of the *Telecommunication Vocabulary* ;

considering, finally,

that the International Electrotechnical Commission has prepared a glossary of definitions, some of which concern telecommunication, under the title of *Electrotechnical Vocabulary*, but that this document is in process of revision,

unanimously declares to view (3^o)

that it would be desirable for the *Glossary of Definitions* prepared by the International Telecommunication Union to be sent to the International Electrotechnical Commission, with the request that its contents be taken into consideration in the preparation of the *Electrotechnical Vocabulary*.

Recommendation No. 221. Letter symbols

The C. C. I. T.,

considering

that universal use of common notations, or notations drawn up according to the same conventions, facilitates the reading of documents on the technical aspects of telecommunication ;

that a list of letter symbols for the principal terms used in general electrotechnics has already been drawn up by the International Electrotechnical Commission, but does not fulfil all the technical requirements of telecommunication ;

that the C. C. I. F. has already undertaken the study of additions to the list in the case of symbols relating to telephony and proposes that the other International Consultative Committees should be associated with the work ;

that such collaboration is necessary in view of the large number of symbols which would be of general interest,

unanimously declares the view (1^o)

a) that there are grounds for studying the addition to the list of *letter symbols* already drawn up by the International Electrotechnical Commission of technical telecommunication symbols ;

b) that it appears convenient to proceed by setting up a Joint Committee formed of Study Groups set up by each of the International Consultative Committees, and by the preparation by the *Joint Study Group* in question of a common list to be submitted for acceptance to the I. E. C. after approval by the International Consultative Committees ;

considering, moreover,

that the XIVth Plenary Assembly of the C. C. I. F. has also made provisional recommendations regarding various points of notation of interest to telephony, but that a number of telegraph Administrations

have informed the C. C. I. T. of objections in regard to certain of the symbols recommended (which are also of technical interest for telegraphy), in reference to the choice of letters or the alphabets used;

that in fact, in view of the large number and the variety of electrical, geometric and mechanical quantities which must be taken into consideration in studying the different problems which concern telecommunication, and the relatively small number of notations which are available, it would not seem possible to provide for a unique relation between symbols and objects or vice versa, even with the assignment of symbols to the quantities of most frequent occurrence;

that the use in a specific connection of notations universally adopted, although desirable in itself, appears less essential than the use of wholly coherent notations,

unanimously declares the view (20)

a) that, in preparing the list of letter symbols for telecommunication, where there is a possibility of conflict between different notations, it is expedient to provide so far as possible for reserve symbols;

b) that, in addition, it would be advantageous to recognize officially that while it is convenient in principle to use standardized symbols wherever possible and in preference to all others, it is always permissible provided there is no risk of confusion, to:

1. Substitute small letters for capitals in the same alphabet and vice versa.
2. Omit unnecessary suffixes.
3. Replace round letters, cursive letters or letters of the Greek alphabet by the corresponding Roman letters.

Recommendation No. 226. Graphical symbols

The C. C. I. T.,

considering

that the list of graphical symbols for telecommunication prepared in June 1935 by a Joint Committee set up by the International Telephone, Telegraph and Radio Consultative Committees, and perfected and subsequently approved by the International Electrotechnical Committee, is at present in general use and is very serviceable;

that experience has shown, however, the need for modification of detail either to clarify the nomenclature or to make the symbols clearer or easier to draw;

that, in addition, new technical developments and new operating methods require the introduction of new symbols;

that the C. C. I. F. has already studied the revision of this list in the case of symbols relating to telephony and has proposed that the other International Consultative Committees should be associated in the matter;

unanimously declares the view (19)

a) that the revision of the list of *graphical symbols* for telecommunication calls for study;

b) that it would seem expedient to follow the same procedure as was adopted in the drawing up of the said list—namely, the appointment of a Joint Committee composed of Study Groups set up by each of the International Consultative Committees;

considering, moreover,

that certain proposals relating to symbols for telegraphy have already been submitted, and that if their examination does not permit the formulation of detailed recommendations, it at least permits general inferences to be drawn;

unanimously declares the view (2°)

that it is desirable :

- a) to add to the list the following supplements : possibility of adopting, as a variant for telegraph relays, the same methods of representation as for telephone relays; and introduction of symbols for mechanically operated contacts;
- b) to re-examine in particular the symbols in respect of repeaters and telegraph equipment.

Recommendation No. 241. Universal decimal classification

The C. C. I. T.,

considering

that a proposal has been made to study the advantages of the *universal decimal classification* of the International Institute of Bibliography for indexing technical documents and literature relating to telegraphy;

that in principle the indication by the author himself of the most suitable number would enable the classification of documents, and compilation of an index to be performed by staff not familiar with the technicalities involved or with foreign languages;

that numerous scientific and technical periodicals already make use of this system, although with various national differences, or in conformity with various editions, all more or less different one from the other, of the official tables;

that with particular regard to telegraphy, and even in a more general sense to telecommunication, the tables at present in force have definite defects;

that, in addition, the principle of universal decimal classification itself, while applicable to activities of an essentially general character, is open to question when it is applied to collective studies bearing on various points of detail, inasmuch as, even though it avoids undesirable juxtapositions in the filing of documents, it lends itself less readily to the search for texts relating to a specific secondary subject;

that in considering possible improvements in that part of the list which relates to telegraphy, it would be convenient to undertake a complete, simultaneous and coordinated recast of all the chapters relating to telecommunication;

unanimously declares the view

a) that, in its present state, that part of the universal decimal classification which relates to telegraphy would not appear entirely to meet modern technical requirements;

b) that, if any other International Consultative Committee were to propose the recast of that part of the list which relates to telecommunication, the International Telegraph Consultative Committee could not dissociate itself from the question;

c) that it would therefore seem advisable to entrust the work to a *Joint Study Group* formed out of the Study Groups set up for the purpose by the International Consultative Committees, with the possible co-operation of the International Institute of Bibliography.

Recommendation No. 301. Definitions relating to telegraph transmission

The C. C. I. T.,

considering

1. that the signals of the standard telegraphic alphabets are composed of significant elements with theoretical durations equal to, or multiples of, the duration of a *unit interval* determining the rate of formation of the signals;

2. that for the study of telegraph transmission, and the requirements of practice, it is necessary to take into account certain instants of modulation at the transmitting end of the telegraph connection, and the corresponding instants of restitution of the said modulation, which restitution is effected by the movements of the moving part of a receiving relay, or the corresponding changes in an electrical device serving the same purpose,

unanimously declares the view

that the following definitions should be adopted :

1. The rate of formation of the signals shall be called *modulation rate* or *telegraph speed*, and shall be measured in *bauds* by the reciprocal of the duration in seconds of the unit interval.

2. The beginning of a signal element shall be known as *characteristic instant*.

3. In the case of standardized telegraph systems *other than start-stop systems*, a telegraph modulation effected by a transmitter, or a restitution of the modulation at the receiving end is said to be *distortionless* or *perfect*, if the respective characteristic instants are separated by intervals of time equal to the theoretical intervals.

Where this is not the case, and the characteristic instants accordingly are at unequal intervals (slow or fast) as compared with the corresponding theoretical instants, the telegraph modulation or its restitution shall be said to be affected by distortion. The absolute value of the ratio of the highest algebraical difference between the above displacement in time to the unit interval is called the *degree of distortion of the modulation* or *of the restitution*.

4. In the case of *start-stop* telegraph systems :

a) the expression *degree of gross start-stop distortion* of a modulation or a restitution shall mean the ratio to the theoretical unit interval corresponding to the standardized modulation rate of the absolute value of the greatest displacements found to exist between the characteristic instants of the modulation or of the restitution and the corresponding theoretical instants as determined with reference to the characteristic instant of the start element of each signal;

b) when, in determining the theoretical characteristic instants, the mean unit interval based on the actual modulation rate is substituted for the theoretical unit interval corresponding to the standardized rate, the degree of distortion measured is called the *isochronous start-stop distortion*.

Remark 1 : For the practical determination of the mean unit interval, only those characteristic instants of elements which are of the same sense as the start element should be taken into account.

Remark 2 : The interval of time between the characteristic instants of the successive start elements, or the duration of the stop elements, have in general very little influence on the conditions of reception provided such intervals or durations are greater than certain limits, which it may be necessary to specify in connection with the standardization of apparatus and the requirements with regard to telegraph links.

5. The expressions *degree of inherent distortion* or, as the case may be, *degree of start-stop distortion* of a channel shall be deemed to mean the degree of distortion of the restitution of the telegraph modulation, where the applied modulation is perfect, and the relay or equivalent receiving apparatus appropriately adjusted for the conditions of use.

6. The expression *degree of service distortion* shall be deemed to mean the degree of distortion measured, when a specific text is transmitted without distortion for a specified duration.

7. In the case of the *inherent distortion* of a channel and *service distortion* it is convenient to distinguish between :

- a) *characteristic distortion*, which is due in general to the redissual effect of preceding signals;
- b) *bias* or *dissymmetric distortion*, which results e. g. from unbalance of signalling supplies, or from dissymmetrical adjustment of the sending or receiving apparatus;

- c) the *irregular distortion*, which results from outside disturbance or irregularities in the operation of the apparatus concerned.

Note by the Permanent Secretariat of the C. C. I. T. : See Draft Recommendation I/I of class C issued by Study Group No. I and published as an Annex to the text of question III. o.

Recommendation No. 302. Definition of the apparatus margin.

The C. C. I. T.

unanimously declares the view

that it is advisable to adopt the following definitions :

In general, the margin of a telegraph apparatus represents the maximum degree of distortion of the circuit at the end of which the apparatus is situated which is compatible with the correct translation of all the signals which it may possibly receive.

It is useful to consider in particular the *theoretical* margin, the *effective* margin, and the *nominal* margin.

The *theoretical* margin is that which could be calculated from the construction data of the apparatus, assuming that it is operating under perfect conditions.

The *effective* margin of an apparatus considered individually is that which could be measured on the apparatus under actual operating conditions.

The *nominal* margin of a type of apparatus represents the minimum value set for the effective margin of these pieces of apparatus under standard operating and adjustment conditions for the type.

Recommendation No. 303. Addition to the definition of the margin of start-stop apparatus.

The C. C. I. T.

unanimously declares the view

that it is necessary to complete the definition of the margin of apparatus given in Recommendation No. 302 by the following definitions.

For start-stop apparatus :

1. The margin is the maximum degree of *isochronous start-stop distortion* of the modulation, which it is possible to apply to the apparatus compatible with the correct translation of all the signals which it should be able to receive, whether the signals composing the modulation are transmitted at intervals or whether they follow one another with the maximum rapidity corresponding to the modulation rate.

2. In particular, it is convenient to consider :

- a) the *net* or *normal* margin, which is represented by the degree of distortion indicated in 1, when the rate of modulation applied to the apparatus is exactly equal to the standard theoretical rate;
- b) the *isochronous* margin which is represented by the degree of distortion indicated in 1, when the mean unit interval of the modulation applied supplied to the apparatus is equal to that which would result from a transmission from the apparatus under examination, assuming it to include a transmitter as well as a receiver.

Recommendation No. 304. Tests of circuits equipped with start-stop apparatus.

The C. C. I. T.

unanimously declares the view

1. that it is not necessary to standardize an international text for the measurement of the margin of a teleprinter;

2. that nevertheless it would be of interest to recommend to the operating Administrations the use of either of the following texts according to choice :

— VOYEZ LE BRICK GÉANT QUE J'EXAMINE PRÈS DU WHARF.

— THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG.

Recommendation No. 311. Determination of the service distortion of the elements of a complete circuit.

The C. C. I. T.,

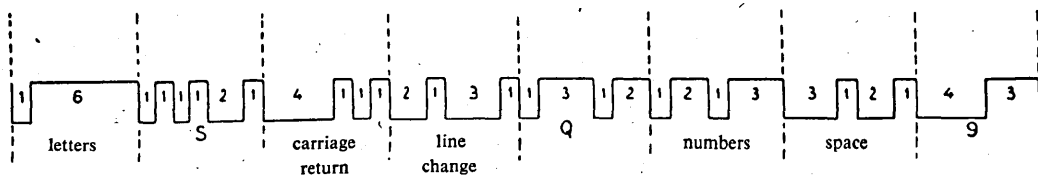
considering

that, for a precise definition of the degree of service distortion permitting the comparison of results of measurements obtained under similar conditions in different places, it is advisable to standardize the wording of the text which should be transmitted for the text;

that it is best to choose a text which can be received directly by start-stop apparatus and which also presents a sequence of the combination recognized as those which generally cause the maximum distortion,

unanimously declares the view

that the text to transmit in the course of measurements of the degree of service distortion should be the following :



this text corresponds to the following sequence of signals emitted by a start-stop apparatus
letters, S, carriage return, line change, Q, numbers, space, 9;

and considering, on the other hand,

that in maintenance adjustments and in the various distortion measurements that may arise in the study of lines and equipment, it would be necessary to make use of a single apparatus offering the possibility of transmitting the different combinations of signals recognized as the most practical for this purpose;

that the unification of the list of these combinations would permit comparison of results obtained in various places,

unanimously declares the view

that it is appropriate to recommend the construction of special transmitters for distortion measurements which could transmit, with one or the other polarity :

1. the specified text for the measurement of the degree of service distortion;
2. a continuous sequence of alternations, the duration of each element being that of the unit interval corresponding to the anticipated telegraph speed;
3. a continuous sequence of alternations, the duration of each element being double the unit interval corresponding to the anticipated telegraph speed;
4. a continuous sequence of signals, each formed by an emission of a duration equal to that of the unit interval, followed by an emission of a kind distinct from the first and equal duration to that of six unit intervals.

Recommendation No. 312. Examination of the influence of the various component sections on the degree of distortion of a complete telegraph circuit

The C. C. I. T.,

considering

that the studies carried out up to now in various countries for the determination of the influence of the various parts of a complete telegraph circuit on the quality of the transmission carried out by this circuit, have made it possible to compile a large number of measurement results relating to transmission channels of varied characteristics;

that in order to make it possible to gather together over a few years sufficient material to provide an answer, it is desirable for these results to be accompanied, on presentation, by sufficient information about the conditions of measurement,

unanimously declares the view

that it is desirable for administrations to undertake measurements of the service distortion of simple telegraph circuits or circuits formed by placing sections end to end;

that, in the case of compound circuit, the measurements should, as far as possible, refer *both* to the complete circuit *and* to its various sections;

that these results should be sent, for examination, to the appropriate Study Group;

that the statement of each of these results should be accompanied by information about the conditions of the test which could have affected the determination of the measured values (information will be found about conditions which should be mentioned in the various cases), and, if necessary, for operated circuits, accompanied by results obtained under working conditions;

that the measurements should refer not only to circuits between trunk exchanges, but also to circuits extended by secondary lines.

ANNEX

Measurement of service distortions

In presenting results of measurements of service distortion for analytical study it is necessary to mention the following principal points;

composition of the circuit: number of sections, their length, their method of use (infra-acoustic, harmonic, etc.), their method of linking;

electrical characteristics of the circuits used (method of loading or cut-off frequency; resistance and capacity);

type of transmitting, receiving or repeater equipment: theoretical diagram and information about essential characteristics;

conditions of current supply, and, if necessary, of switching (carrier frequency used, power emitted simple or double switching);

number of coexistent channels—presence, if any, of disturbance (its nature and its degree);
nature of the adjustment on the parts of the circuit (customary adjustment for the usual service, extra-careful adjustment for tests).

Most of the information tested above can be presented in the form of diagrams.

(See Question III 1a allocated to Study Group No. II.)

**** Recommendation No. 313. Particulars regarding the study of the influence
of the different constituent sections on the quality of transmission
of a complete telegraph connection**

(See Question Geneva 1 allocated to Study Group No. II)

**Recommendation No. 331. Admissible limits for the apparatus margin and for the degree
of distortion of transmission channels**

The C. C. I. T.,

considering

that, in order to allow draft plans for the establishment of international telegraph circuits to be studied, it is convenient to set limits for both the apparatus margin and the degree of distortion of transmission channels;

that the effective operation of the service requires that the apparatus used should be kept in good working order;

that research carried out for the determination of the margin of standardized types of apparatus at present in use makes it possible to determine which lower values of the margin can reasonably be set, at the present stage of technical development;

that when this fixing of the margin has been done it is possible to determine the tolerable limits of circuit distortion,

unanimously declares the view

1. that, in order to be used in the international service, the types of apparatus must show a nominal margin at least equal to 0.35 (35 %), a value which could be revised;

2. that, on the other hand, the apparatus in service must be maintained and adjusted in such a way that their effective margin is never lower than 0.28 (28 %), a value which could be revised;

3. that complete circuits must be set up and maintained in such a way that their service distortion is lower than 0.28 (28 %);

4. that the service distortion of each of the sections likely to become part of a complete circuit must be as low as possible and, in any case, cannot exceed 0.10 (10 %).

(See Question Geneva 4 allocated to Study Group No. II, Geneva 15 allocated to Study Group No. III and Provisional Recommendation 375 (II/9).)

Recommendation No. 332. Received current curve

The C. C. I. T.,

considering

that the precise determination of the shape of the received current curve would involve too many difficulties to be of use in the normal service;

that the quality of the transmission is sufficiently defined by Recommendation No. 331,
 unanimously declares the view
 that there is no reason to define the shape of the received current curve.

Recommendation No. 335. Technical supervision of operating

The C. C. I. T.,

considering

that, for the technical supervision of international telegraph circuits, periodic measurements are necessary;

that it would be useful to employ a method of reference measurement as an indication of the quality of transmission;

that the best methods are those which allow the degree of distortion to be read directly,

unanimously declares the view (1^o)

that it is advisable to carry out the regular monitoring of a telegraph circuit under service conditions (provisionally, once a month);

that it would be well to use the stroboscopic method for this purpose, or an equivalent method which provides a direct reading of the distortion, and then to use the standardized text;

and, considering

that in international telegraph circuits, which are composed of several sections, the mere examination of the results of measurements taken on the different sections does not make it possible to judge with certainty the quality of transmission of the circuit as a whole,

unanimously declares the view (2^o)

that, in all international telegraph circuits, it is advisable to carry out supervision between the terminal telegraph services measurements divisions.

(See Question Geneva 14 allocated to Study Group No. II.)

*** Provisional Recommendation No. II/16 (336). Maximum acceptable limit for the duration of interruption of telegraph channels arising from failure of the normal power supplies**

The C. C. I. T.,

considering

that it is not the function of the C. C. I. T. to issue recommendations on the actual methods of arranging the automatic replacement of a normal power supply by a reserve supply, but to indicate to the C. C. I. F., which is responsible for such recommendations regarding power supplies for all line equipment, that the replacement of one supply by another should not cause any interruption of such a nature as to disturb seriously the telegraph communication;

and that in switched telegraph networks an interruption of 0.3 second of the telegraph current would be translated into a release of switches, and that the relays controlling the release are arranged to operate in slightly less than 0.3 second;

that the C. C. I. F. Sub-Committee on Urgent Transmission Questions has issued in Document No. 15, 3rd C. E., 1950/1951, page 80, a new note to the paragraph of the 1949 Yellow Book, Volume III, pages 113 and 114, entitled "Alimentation en énergie électrique",

declares the view

that it is desirable that no interruption of the telegraph current should occur as a result of failure of a normal power supply.

If, however, it is impracticable to avoid an interruption, then its duration should in no case exceed 0.150 second.

Recommendation No. 338. Use of static relays for transmission

The C. C. I. T.,

considering

that the substitution of static relays utilizing the properties of metal rectifiers for electromagnetic transmitting relays for voice-frequency telegraphy is already widely adopted and assures a reduction of distortion of the transmitted signals, great stability, and dispenses with all necessity for adjustment once the device is in service;

that the devices in use in different countries differ in detail but operate satisfactorily, so that it appears unnecessary to recommend any particular one, and that it seems sufficient to indicate how the characteristics of interest in the practical application of such devices can be defined, without specifying the values of these characteristics, with the exception of the difference in the attenuation introduced by the relay in the transmitting and the non-transmitting conditions;

unanimously declares the view

a) that the use of static relays utilizing metal rectifiers properties for transmission on voice-frequency telegraph channels is advantageous;

b) that in the study of the specification of a static relay the following quantities should be considered :

1. Band of carrier frequencies to which the device is adapted.
2. Input resistance (or impedance characteristics) of the direct current control circuit.
3. Maximum value of the controlling direct current (as determined by the dimensions and properties of the rectifiers used).
4. Minimum value of the controlling direct current (as determined by the curvature of the characteristics of the rectifiers used).
5. Impedance of the system as measured from the carrier current input terminals a) in the case of transmission and b) in the case of non-transmission of signals.
6. Impedance of the system as measured from the line terminals a) in the case of transmission and b) in the case of non-transmission.
7. Voltage of the carrier frequency.
8. Loss introduced by the relay in the case of transmission, in the case of non-transmission, and in the absence of any controlling direct current.
9. Maximum coefficient of harmonic distortion.
10. Particulars of the variations in the essential properties of the relay with changes of temperature, ageing, etc.
11. Symmetric of the device;

c) that the difference in the loss introduced by the relay in the cases both of transmission and of non-transmission should be as high as possible and, in any case, at least equal to 3.5 nepers or 30 decibels.

Recommendation No. 351. Balancing of artificial lines and the adjustment of apparatus in the case of duplex circuits with rapid equipment on special lines (aerial or cable)

The C. C. I. T.,

unanimously declares the view

that the following rules are applicable for the balancing of artificial lines and for the adjustment of apparatus in the case of international duplex circuits with rapid equipment on special lines (aerial or cable).

On a line involving several relay stations, the balancing of the artificial lines should be carried out at the same time, insofar as possible, over the various sections of the circuit.

It is a line of this type to which the procedure below is applicable; the method to be adopted when the circuit does not include any relay stations is easily deduced from it.

Service communications may be exchanged either by Morse over the circuits to be adjusted or by telephone over a service circuit.

We will suppose in what follows that this exchange takes place by Morse.

Assume a circuit A.....B.....C.....D with two relay stations, B and C, between the terminals of the line, A and D.

a) To carry out the balancing, stations B and C are placed in the disconnect position.

Station A calls station B (likewise station D calls station C) and says: "give R". Station B answers: "here is R", and, in the case of simple current, sees that its key remains in the rest position, whereas, in the case of double current, it substitutes for its resting battery the resistance provided for the purpose.

Station A immediately proceeds to establish a balance between the artificial and real lines.

Station B observes its galvanometer for several moments, to make sure that the intensity of received current is sufficient and, in the case of double current, that this intensity is the same for both directions of current. If in this respect it observes anything irregular, it immediately informs station A, furnishing all useful information.

Station A, as soon as it has obtained balance, calls B; the latter places his resting battery in the circuit if need be, and A says: "here is R" and proceeds as has been described above for B giving R to A.

Station B now establishes balance of the artificial and real lines in the direction of A, and A in turn observes the needle of its galvanometer in order to measure the intensity of the received current, and possibly the equality of this intensity for both directions of current.

When B has completed the balancing, it calls A, the latter restores his resting battery, if necessary, and B asks A to wait in order to deal with the section toward C.

When the two repeater stations have completed the balancing in both directions, they exchange the signal "DF" with each other as well as with their neighbouring end stations, and establish direct communication. The end stations test the circuit. The intermediate stations observe the passage of the signals and carry out the operations that may be necessary.

b) The end stations then connect the circuit to the working apparatus (Baudot, Siemens, Wheatstone, etc.) in order to proceed to the operations preliminary to their being used for the handling of traffic.

At first, the end stations transmit one after the other and then both together, for two minutes at a time, a series of "alternations" in order to determine, or to permit other repeater stations to determine, whether it is necessary to refine the adjustment of the armature travel of the relay(s), and whether it is advisable to modify somewhat the value of one artificial line or the other.

c) After this, the two end stations transmit simultaneously for 1 or 2 minutes the repetition of a letter or of a small group of letters in Morse signals which are reproduced in the monitoring apparatus (Morse or Sounder) of the repeater station. With the Baudot or Siemens apparatus these Morse signals are obtained by a suitable sequence of emissions.

d) Then the stations are put into correspondence with each other and the equipment adjusted for transmissions first in one direction and then in the other.

It is evident that the imperfections which then appear are the fault of the equipment or the batteries of the end or intermediate stations and that the balances are completely beyond question.

e) Everything being in order with respect to line balances, both end stations, one after the other, transmit while their receiving apparatus is functioning.

If their transmission disturbs their reception, it is proof that at the station which is carrying out the test or at one of the relay stations—in the direction of the other end—the balance is insufficient.

f) The end stations often have to request the relay stations to allow a slight displacement or the armature of the relay which transmits the signals to them either toward the working stop or toward the resting stop. This is done with the aid of the Morse key substituting momentarily, if necessary, for the transmitter employed during operation. This procedure is briefly indicated. For example: the letter "P" (plus) preceded by the call-signal of the station to which the request is addressed to say "displace toward the working stop" and the letter "M" (minus) preceded by the same call signal to say "displace toward the resting stop". It is self-evident that, when there is only one relay station on the line, the transmission of the call signal is pointless.

Recommendation No. 352. Characteristic factor of the quality of balance

The C. C. I. T.,

considering

that the quality of a telegraphic communication is best characterized by distortion;

that the measurement of telegraphic distortion is now a common practice,

unanimously declares the view

a) that the quality of balance of a duplex telegraph circuit can provisionally be characterized by the difference in the distortions of the signals received:

1. When no signals are transmitted on the sending channel.

2. When signals are transmitted over that channel;

b) that measurements should be made at both ends of the circuit.

Comment issued by Study Group No. 1: "The quality of balance thus characterized is not applicable to telegraphy on long submarine cables."

Provisional Recommendation No. II/1 (360). Designation of international telegraph circuits

The C. C. I. T.

declares the view

that international telegraph circuits will be designated

a) first by the localities or terminal offices, arranged in alphabetical order according to the spelling of the country;

b) by an indication of the service using the circuit according to the following table:

Public service, point to point circuit	TG
Private service, point to point circuit	TGP
Circuit of the public switching network	TGX
Telex circuit	TX
Circuit of a private switching network	TXP
Service circuit	TS

c) by a serial number, using a separate continuous series for each group of circuits.

Recommendation No. 361. Types of lines

The C. C. I. T.,

considering

that cable lines are better protected from disturbance than aerial lines,
that it will however be necessary in certain cases to continue to employ aerial lines,

unanimously declares the view

that for the international high-speed telegraph-service as much use as possible should be made of the circuits of the long-distance cable system.

Provisional Recommendation No. II/3 (362). Reserve channels for maintenance measurements on channels of international V. F. telegraph systems

The C. C. I. T.,

considering

that it is desirable that maintenance measurements on the channels of international voice-frequency telegraph systems should disturb communications as little as possible,

recommends

that, whenever possible, measurements on a working channel of a voice-frequency telegraph system should be carried out only after the channel concerned has, if necessary, been replaced by a spare channel,

and to this end, the C. C. I. T. considers that it is desirable that one channel should be reserved for this purpose in each voice-frequency telegraph system.

Provisional Recommendation No. II/4 (363). Periodicity of maintenance measurements to be carried out on the channels of international voice-frequency telegraph systems

The C. C. I. T.,

having regard to Recommendation 335 on the technical supervision of operating;

considering

that for such supervision, maintenance measurements on international voice-frequency telegraph channels are necessary,

recommends

1. that maintenance measurements be carried out on international voice-frequency telegraph channels once a month;

2. that they should be carried out shortly after carrying out maintenance measurements on the telephone circuit used for the V. F. telegraph system;

3. that for the time being there is no need to carry out measurements more frequently on channels making up long circuits or circuits used in switching networks.

**Provisional Recommendation No. II/6 (364). Routine maintenance measurements
on the international sections of international telegraph circuits
and the periodicity of such measurements**

The C. C. I. T.,

considering

that the technical services of Administrations and private operating agencies that are members of the C. C. I. T. do not all carry out periodical maintenance measurements on telegraph circuits;
that it would be advisable to acquire adequate experience before recommending such measurements,

recommends

that international measurements should be carried out on the international section of international telegraph circuits;

that, in order to assess the efficiency of such measurements, the United Kingdom Administration, which is entrusted with submitting a report on the matter, will initiate tests on certain circuits;

that these provisional tests should be made at least every three months, or monthly if the Administration entrusted with the matter regards the data collected by means of three-monthly measurements as insufficient.

*** Recommendation No. 366. Organization of the maintenance of international telegraph circuits**

(Amended in conformity with Provisional Recommendation II/21)

The C. C. I. T.,

considering

that, in order to ensure satisfactory co-operation between Administrations and private telegraph operating agencies interested in the maintenance of international telegraph circuits, and in order to ensure the maintenance of satisfactory transmission in the international telegraph service, it is necessary to unify the essential action to be taken for the establishment and maintenance of international telegraph circuits,

unanimously declares the view

1. that periodical maintenance measurements should be taken on international V. F. telegraph systems, and that documents relating to such measurements should be exchanged;

2. that a *permanent Committee* should be entrusted with the task of solving all questions of an urgent character relating to the application of the Recommendations of the C. C. I. T. and the C. C. I. F. in regard to the establishment and maintenance of international telegraph circuits;

3. that the said permanent Committee should act in constant contact with the corresponding permanent Sub-Committee already appointed by the C. C. I. F.;

4. that the responsibilities for the maintenance of satisfactory transmission, and (as and when necessary) the removal of faults on an international V. F. telegraph system should be assumed by one of the terminal stations of the system.

The terminal station in question to be known as the *System Control Station*.

The said station to be appointed for the purpose by the Administrations and private telegraph operating agencies concerned on the occasion of the establishment of the V. F. telegraph system concerned.

The System Control Station to be entrusted with co-ordination of the execution of the maintenance measurements to which paragraph 1 above relates;

5. that the responsibilities for the maintenance of satisfactory transmission, and (as and when necessary) the removal of faults on an international telegraph system should be allocated between the different stations concerned as indicated below.

One station of the circuit should assume the principal responsibility for the maintenance of satisfactory service on the circuit.

The station in question should be known as the *Controlling Testing Station*.

This station should be equipped with testing equipment to enable it to make telegraph transmission measurements and in this connection it exercises an executive control over all the other stations on the circuit.

It should be appointed by agreement between the Administrations concerned on the occasion of the establishment of the telegraph circuits concerned.

It should be, wherever possible, one of the terminal stations of the circuit, save in so far as otherwise agreed by the services concerned.

For example, in the case of V. F. telegraph circuits, the Controlling Testing Station should be the most important V. F. terminal station.

The Controlling Testing Station should be entrusted with the task of coordinating all necessary measures in the case of faults on the circuit and should keep a record of all faults.

When a fault comes to the notice of another station on the circuit, this station should take steps to secure suitable action on the part of other stations concerned; but the Controlling Testing Station is nevertheless responsible for ensuring that the fault is cleared as soon as possible.

The Controlling Testing Station should be in a position to furnish all requisite information in reply to enquiries on the subject of faults—e. g. in regard to the time of any fault, the location of the fault, the orders given for dealing with it and the times of restoration of the circuit.

In order, however, to increase the flexibility of the organization and the rapidity of the removal of faults, the Controlling Testing Station will confine itself in each foreign country to securing the co-operation of a *station* to be known as the *Sub-Control Station* of the circuit.

The Sub-Control Station should assume, within its own territory, the responsibilities indicated above in the case of the Controlling Testing Station and should therefore be equipped with testing equipment to enable it to make telegraph transmission measurements.

Such delegation of responsibility shall not affect the authority of the Controlling Testing Station, with which the primary responsibility for the maintenance of satisfactory service on the circuit will continue to rest.

The Sub-Control Station shall be appointed by the technical Service of the Administration concerned.

It shall furnish detailed information to the Controlling Testing Station regarding faults occurring in its own country.

To facilitate the control of tests, circuits shall be divided into *Test Sections* (parts of a circuit between two telegraph stations). Each section shall be under the control of a *Testing Station* responsible for the localization and removal of faults on the section concerned. The Testing Station shall furnish detailed information as to the faults occurring in the section under its control to the Sub-Control Station (or, if necessary, the Controlling Testing Station).

In the case of V. F. telegraph channels, each channel shall constitute a test section. The Testing Station will in this case be the principal V. F. telegraph station at the end of the section concerned.

Recommendation No. 367. International telegraph circuit advices

The C. C. I. T.,

considering

that, for the satisfactory and efficient maintenance of international circuits, full information regarding their constitution should be exchanged between the Administrations concerned;

(367)

that the information judged to be necessary is the following :

- a) circuit designation as known in the country issuing the form;
- b) user of the circuit, whether a public Administration or a private telegraph operating agency;
- c) type of operation allowed on the circuit;
- d) particulars of apparatus used at each end of the circuit, including (where appropriate) the Answer-Back code;
- e) telephone numbers of the Controlling Testing Station and Sub-Control Stations for the circuit;
- f) date on which the circuit is opened for service;
- g) terminal station, nominated by mutual agreement, to act as Controlling Testing Station for the circuit;
- h) Sub-Control Station and Testing Stations nominated in each country through which the international telegraph circuit passes;
- i) diagram of the make-up of the circuit;
- j) characteristics of the sections composing the circuit : designation of the channel and of the Voice Frequency telegraph system in the case of a V. F. section;
length and resistance of the circuit in the case of a direct current section;
- k) data to be supplied provisionally and optionally, and only by the countries which are able to supply them—distortion for each section of the circuit and the overall distortion measured by using the test signals Q 9 S, transmitted at the agreed speed of working (50 bauds), in both directions of the circuit, when it is opened for service,

unanimously declares the view

that when an international telegraph circuit is put into service, a telegraph circuit advice should be prepared and exchanged between the Administrations concerned;

that in order that these documents may be kept up to date it will be necessary for each Administration to amend these forms and to notify these amendments to the Administrations concerned, after any change;

that the most suitable lay-out for these forms is as follows :

International telegraph circuit advice

	Item	Country: Service:	Issuing authority Telephone number				USER:
1	Circuit designation	A — B					Type of operation:
2	Apparatus and Answer-Back code at „A“ end						
3	Apparatus and Answer-Back code at „B“ end						
4	Date of opening of service						
5	Controlling Testing Station						
6	Sub-Control Station (s)						
7	Testing Station (s)						
8	Diagram of the circuit	A C D E F B O — O — O — O — O — O					
9	Characteristics of Test Sections						Overall distortion:
10	Distortion $\frac{A \rightarrow B}{B \rightarrow A}$						
11	Remarks						

**Provisional Recommendation No. II/2 (368). Routine maintenance programme
for international voice-frequency telegraph systems**

The C. C. I. T.,

considering

that the periodical maintenance measurements on international voice-frequency telegraph systems referred to in Recommendation 366, should be facilitated to the greatest possible extent;

that it is advantageous to Administrations and private operating agencies to know the dates on which maintenance measurements are to be carried out on all the Test Sections outside their territory of telegraph circuits passed through their network,

recommends

1. that for each voice-frequency telegraph system, one or more days should be appointed for maintenance measurements, the initiative being taken by the technical service responsible for the System Control Station in agreement with the technical services of the two Administrations or private operating agencies concerned;

2. that the dates for the measurements should be communicated once a year (on 1st October) to the Secretariat of the C. C. I. T.;

3. that the Secretariat of the C. C. I. T. should undertake to collect the information thus obtained into a document entitled : *Routine maintenance programme for international voice-frequency telegraph systems*, and to communicate them to administrations and private operating agencies which are members of the C. C. I. T. and which ask for them;

4. that if, exceptionally, agreement is not reached between technical services with regard to the dates for measurements, the matter be referred to the permanent committee mentioned in Recommendation 366, which will make proposals designed to remedy such a state of affairs as quickly as possible.

**Provisional Recommendation No. II/5 (369). Maintenance measurements
to be made on V. F. telegraph systems**

The C. C. I. T.

having regard to Recommendation 335 regarding technical supervision of operating;

having regard to Recommendation II/4 (363) on the periodicity of maintenance measurements to be made on international V. F. telegraph channels,

considering

that it should be clearly laid down what maintenance measurements are indispensable to ensure the correct operation of V. F. telegraph channels,

recommends

1. that maintenance measurements and any necessary adjustments of V. F. telegraph channels should be made of:

- a) the voltages and frequencies of the V. F. carrier supplies (these measurements must be made at least once a month, but in the case of a central V. F. carrier supply, daily tests are recommended);
- b) the power supply voltages (these measurements should be made at least once per month);
- c) the output level of each "send" filter;
- d) the output level of each "receive" filter;

- e) the receiving apparatus, to ensure that it is operating at the optimum point of its level regulation characteristic;
 - f) the receiving relay, if necessary;
 - g) the distortion with symmetrical signals 1/1 or 2/2 after adjustment of the relay or of the receiving equipment for minimum distortion;
 - h) the distortion on dissymmetrical signals 1/6 and 6/1, if necessary;
 - i) the distortion on the standard text given in Recommendation 311. (It would be advisable for the last measurement to be made at the levels: normal, maximum and minimum.);
2. that unless otherwise specified, the measurements should be made at a modulation rate of 50 bauds;
3. that the results of the measurements made on the international channels should be exchanged directly by telegraph or telephone between the measuring stations.
-

Provisional Recommendation No. II/7 (370). Maintenance measurements to be carried out on the international sections of telegraph circuits when that section is made up of at least two channels

The C. C. I. T.,
 having regard to Recommendation 335, on the technical supervision of operation;
 having regard to Recommendation II/5 (369), on maintenance measurements to be carried out on voice-frequency telegraph systems,
 considering

that, in the case of an international section made up of at least two telegraph channels, the only maintenance measurements that can be carried out are measurements of telegraph distortion,

recommends

- 1. that the maintenance measurements carried out on the international section of a telegraph circuit made up of at least two telegraph channels should be :
 - a) the distortion experienced with 1/1 or 2/2 symmetrical signals;
 - b) the distortion experienced on the standard text of Recommendation 311;
and, if desired
 - c) the distortion experienced with dissymmetrical 1/6 and 6/1 signals;
 - 2. that, unless otherwise specified, the measurements should be made at a modulation rate of 50 bauds.
-

Recommendation No. 371. Standardization of aerial telegraph conductors

The C. C. I. T.,
 considering

that it is desirable to standardize the characteristics of international telegraph conductors;
 that the tests made with the object of obtaining circuits not subject to contact and to variations of insulation, by using wires provided with insulation other than rubber and paper, have not given satisfactory results;
 that the use of wires insulated by rubber would not guarantee the perfect handling of traffic for a very long period and would increase expenses;
 that the use of wires insulated by paper and lead would greatly increase costs,

unanimously declares the view

1. that, for aerial conductors used in the international high-speed telegraph service, it is desirable to employ copper or bronze wires answering the following specifications :

	diameter	tensile strength	resistivity at 20 degrees centigrade
	at least	at least	maximum
Copper	3	40	1,820
Bronze	2.5	60	2,780
	m/m	kg/mm ²	microhms-cm

2. that it is not desirable to replace open wires by insulated wires with the aim of improving the electrical properties of the conductors.

Recommendation No. 372. Standardization of the capacity of telegraph circuits

The C. C. I. T.,

considering

that the standardization of the capacity of telegraph circuits serves to ensure an economical organization of the international telegraph network,

unanimously declares the view

1. that the telegraph transmission channels making use of telephone cables should allow the operation of standardized equipment with a telegraph speed of 50 bauds;

2. that, for the services using equipment which work at a different speed, Administrations should reserve the right of mutual agreement among themselves on the employment of special circuits;

3. that the existing aerial lines should be excepted from capacity standardization.

Provisional Recommendation No. II/9 (375). Standard limits to be applied in planning international point-to-point telegraph communications and switched networks, by means of start-stop apparatus conforming to C. C. I. T. recommendations

The C. C. I. T.,

considering

that Administrations must agree on the composition of the international section and the national sections before setting up an international point-to-point telegraph circuit;

that, for the inter-connection of switched public or private national networks a chart showing the distribution of telegraph distortion between national networks and international circuits connecting the international terminal exchanges is required;

that, for this purpose, provisional standards, based on the results of practical experience and on studies of the composition of telegraph distortion should be laid down for Administrations;

that, on properly adjusted channels, the degree of distortion in standardized telegraph signals at 50 bauds caused by trunk sections, when these sections are composed of 1, 2, 3 or 4 voice-frequency telegraph channels, should not exceed :

Number of voice-frequency telegraph channels	Limit of degree of distortion for 1/1 or 2/2 signals	Limit of degree of rhythmic service distortion for the standard text.
1	4 %	10 %
2	6 %	18 %
3	6 %	24 %
4	6 %	28 %

and considering C. C. I. T. Recommendations 301, 302, 303, 331 and 621;

declares the view

a) that, in planning international telegraph communications, whether point-to-point or by switching, the Administrations should use the following standard limits valid for start-stop apparatus and for channels conforming to the recommendations of the C. C. I. T.

1. Limit of the degree of gross start-stop distortion, measured by a start-stop distortion measuring set at the beginning of the trunk section of the circuit (*i. e.* at the point where the circuit enters the long-distance line telegraph equipment) and including the effect of the emission distortion of the transmitting apparatus 12 %

2. Limit of the degree of rhythmic service distortion for the standard text caused by the trunk section of the circuit :

when one voice-frequency telegraph channel is used for the communication 10 %

when two voice-frequency telegraph channels are used for the communication 18 %

when three voice-frequency telegraph channels are used for the communication 24 %

when four voice-frequency telegraph channels are used for the communication 28 %

3. Limit of the degree of the gross start-stop distortion, measured by a start-stop distortion measuring set, which can be present in signals transmitted into the local section of the circuit without the receiving apparatus failing to translate any of the signals which it should be able to receive 30 %

b) that these standards take no account of the possibility of including regenerative repeaters in circuits;

c) that these standards presuppose that the distortion introduced by the local section of the circuit is negligible, and that, should that not be so, Administrations should agree amongst themselves on the degree of distortion admissible in the various sections of the communication, and on the number of voice-frequency telegraph channels which can be used;

d) that these standards should be regarded as provisional and that they be given further study;

e) that Administrations should however use them, in order to agree on the maximum number of voice-frequency telegraph channels which may compose the international section of a circuit and in order to determine the characteristics of their national networks due to be connected to the networks of other countries, on the understanding that the rhythmic service distortion, originated by the trunk section, may not in any circumstances exceed 28 %.

Recommendation No. 381. European switched telegraph network

The C. C. I. T.,

considering

that in the interest of the most expeditious and reliable transmission of telegrams all European countries should have the possibility of routing telegrams directly to any other European country;

that the number of retransmissions of telegrams and of intermediate operations—taking due account of the organization of the internal service in each country—should be reduced to a minimum;

that the aim contemplated could be attained by establishing a European switched telegraph network (automatic or manual) on as simple and economic a basis as possible;

that the possibility establishing such a network should be examined and carried out by common agreement between the European countries,

unanimously declares the view

that the establishment of a public switched telegraph network (automatic or manual) should be examined by a Study Group of the C. C. I. T. with the least possible delay;

that the European Administrations should be invited for this purpose to furnish the C. C. I. T., as soon as possible, with data concerning the total volume of their traffic intended for other European countries, specifying the portion of that traffic transmitted by direct routes (telegraph and wireless) and also the volume of traffic which might in future be transmitted over a switched system;

that the C. C. I. T. should study the problem, with particular reference to the following points :

- A. Lay-out of the network and position of the principal exchanges (to be determined on the basis of statistical data).
- B. Utilization of the network for an international Telex service, and the use of the network for other services.
- C. Relations between the European network and national networks.
- D. Influence on the radio network and on fixed telegraphic circuits in Europe (see also L).
- E. Telegraphic correspondence between neighbouring countries.
- F. Identity and traffic of offices connected with the European network.
- G. Choice of switching system :

<ol style="list-style-type: none"> a) manual b) automatic 	{	<ol style="list-style-type: none"> 1. Direct dialling. 2. Recorder system. 3. Office numbering scheme.
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- H. Routing of traffic (automatic routing by auxiliary routes or routing through another country, or a combination of both).
- I. Overflow positions.
- J. Technical questions, particularly such as concern the standardization of conditions and signals:
 - a) " proceed to dial " signal (line condition or printed indications);
 - b) selection by keyboard or dial;
 - c) " disengaged " signal (line condition or printed indication);
 - d) " engaged " signal (line condition or printed indication);
 - e) " out of order " signal (line condition or printed indication);
 - f) " subscriber disconnected " signal (line condition or printed indication);
 - g) call signal for incoming calls (tape telegrams);
 - h) service call signal from receiving office;
 - i) " out of order " call signal occurring during a connection (in particular in cases of failure of the paper movement in the receiver);
 - j) disconnection without impression of supplementary characters;
 - k) Separation of telegrams signal;
- K. Technical questions affecting the quality of the circuits in the network and the use of regenerative repeaters on the circuits of the network.
- L. Tariff questions connected with the use of the network.
- M. Questions affecting the operation of a switched network (in particular, numbering of telegrams, acknowledgement of receipt, etc.).
- N. Questions affecting the establishment of a switched network.

Provisional Recommendation No. II/13 (389). Siting of regenerative repeaters in international telex circuits

The C. C. I. T.,

considering

that insufficient experience has been acquired in the use of regenerative repeaters; that it nevertheless seems desirable to lay down a provisional rule governing the siting of regenerative repeaters, with a view to the

preparation of plans for international telegraph communications by switching; that it would also appear desirable that the signals transmitted by an international terminal exchange should not be affected by a relatively high degree of distortion,

declares the view

that plans should be made for the systematic siting of regenerative repeaters at the point of transmission over international switching circuits,

that, nevertheless, further study should be made of this matter, both from the technical and economic point of view, to decide whether future developments might not make it preferable to only insert regenerative repeaters selectively in the linking circuits of switched systems.

Recommendation No. 391. Coexistence on the same conductors of a cable of harmonic telegraphy or phototelegraphy, on one hand, and telegraphy on phantom or double phantom circuits, on the other

The C. C. I. T.,

considering

that it is advisable not to complicate harmonic telegraphy or phototelegraphy circuits,

unanimously declares the view

that, when the telegraph current on phantom or super-phantom circuits does not influence the magnetic field of the loading coils, the technical conditions stipulated for the coexistence of telephony and telegraphy on phantom or double phantom circuits are also applicable for the coexistence of harmonic telegraphy or phototelegraphy, on one hand, and telegraphy on phantom or double phantom circuits, on the other;

that, when the telegraph current influences the magnetic field of the loading coils and there is doubt about their qualities as far as the effects of these fluctuations are concerned, it is not advisable to resort to such coexistence;

that, in general, it is not advisable to resort to such coexistence.

Recommendation No. 401. Standardization of direct current telegraph circuits employing telephone cables

The C. C. I. T.,

considering

that, to effect smooth co-operation of direct current telegraph devices functioning on channels in telephone cables (infra-acoustic telegraphy, telegraphy on phantom or double phantom cables) as much from the technical as from the operational point of view, it is necessary that the equipment of the circuits should be established on uniform principles,

unanimously declares the view

that in the matter of direct current telegraph circuits making use of telephone cables, terminated at their extremities by telegraph relays, served at the speed of 50 bauds,

and making use of currents taking only two values in steady state, circuit and supervisory equipment should satisfy the following conditions:

- a) for the excitation of relays and the transmission of signals, a working current and a resting current of equal intensity in steady state, but in opposite directions, should be used;

- b) as a general rule, arrangement will be in differential duplex; however, in certain special cases, particularly those of telephone cables with unidirectional transmission, operation will be carried out by separate channels for the two directions of transmission;
- c) the excitation current of the receiving relay will be between 2 and 4 milliamperes for infra-acoustic telegraphy and between 4 and 8 milliamperes for telegraphy on phantom and double phantom circuits;
- d) in general, repeaters will comprise separate receiving and transmitting relays; however, in special cases, the same relay may serve for both functions;
- e) equipment will be constructed in such a way that one may, easily and speedily :
 - replace the source of current by a resistance equal to the internal resistance of that source;
 - insert, during operation, an apparatus for measuring distortion;
 - change lines and apparatus by means of jacks and plugs;
- f) supervisory equipment should allow the following operations to be accomplished in the minimum time :
 - emission of symmetrical alternations at the speed of 50 bauds;
 - measurement in steady state of the effective of operational currents, receiving relays and currents coming from transmitting relays ;
 - measurement of currents in local circuits;
 - determination of data concerning the quality of the circuit balance.

Recommendation No. 411. Switching methods

The C. C. I. T.,

considering

that it is possible to obtain a satisfactory service by single or double switching methods, and with batteries insulated or not insulated from the ground,

unanimously declares the view

that it devolves upon the Administrations or private operating agencies to employ any method for the operation of international circuits, provided that it allows faultless service.

Recommendation No. 412. Grounding

The C. C. I. T.,

considering

that when a cable is not exposed to any induction phenomena, the grounding of the centre point of the source of current may have the advantage of ensuring a more perfect symmetry of the supply voltages of the telegraph circuit in relation to the cable envelope and in relation to the other circuits of the same cable;

that, in the case of a cable exposed to induction phenomena, it is very difficult to fulfil the conditions listed in the White Book of the C. C. I. F. (Volume II, page 23) with grounded power supplies, and that this grounding is not indispensable,

unanimously declares the view

that, when use is made of batteries employed in common for local circuits and line circuits, it is advisable to ground the centre point of these batteries in cases when no induction phenomena is to be feared;

that, in the case of cable exposed to considerable induction phenomena, it is advisable to use a separate source, with no grounding, for each circuit.

Recommendation No. 451. Coexistence in a single non-submarine cable of telephony and direct current telegraphy

The C. C. I. T.,

considering

that experience has shown that there is no obstacle to telephony and telegraphy on separate conductors, telephony and infra-acoustic telegraphy on the same conductors or telephony and telegraphy on single or double phantom circuits being allowed to coexist in a single cable (non-submarine) for the international telegraph service, when suitable measures are taken;

that the C. C. I. F. has studied (White Book, Volume III, page 267) the conditions necessary in the various cases in order not to affect the quality of transmission of the telephone circuits,

unanimously declares the view

that it is possible to allow in a single cable (non-submarine) the coexistence of telephony and direct current telegraph, provided that the conditions stated in the following list are satisfied; specifically concerned are :

telegraphy on conductors other than telephone conductors, under conditions 1, 2 and 5;
infra-acoustic telegraphy, under conditions 1 to 8 inclusive;

telegraphy on phantom circuits, single or double, under conditions 1, 2, 5, 7, 8 and 9.
(The necessary attenuation of low-pass filters can be found by the method indicated in Annex 2 a) of the Report of the IVth C. R. dated 31st May, 1931; see pages 194 to 197 of Volume I of the documents of the IIIrd Meeting of the C. C. I. T., Berne, 1931.)

Conditions

1. The electromotive force produced by the telegraph transmitter in the circuit containing the line must not exceed 50 volts.
2. Where a resistance of 30 ohms, substituted for the line, is placed across the terminals of this telegraph transmitter, the current flowing through this resistance must not exceed 50 milliamperes. This limit is raised to 100 milliamperes if the cable is fitted with coils having a powdered iron core or a core of some other material having equally satisfactory characteristics.
3. The increase in the overall attenuation of the telephone line resulting from simultaneous telegraph installations must not exceed 0.06 neper or 0.52 decibel for an amplification section in the frequency band between $f = 300$ c/s and the maximum transmitted frequency.
4. The impedance variation of the line produced by simultaneous telegraph installations must not exceed 10% in the stated frequency interval, when 4-wire circuits are operated. For 2-wire circuits, the infra-acoustic telegraph installations must not exceed the values laid down by the C. C. I. F. for the exact reproduction of the impedance of the line by the balance networks.
5. The disturbance noises produced by all the telegraph apparatus on a telephone circuit must not exceed, for a (transmitting) level of — 1.0 neper or — 9 decibels and an impedance of 600 ohms, a value which corresponds to a noise voltage of 1 millivolt ¹⁾.

To fulfil this condition, it is advisable to insert low pass filters in the transmission on all telegraph circuits operated by direct current.

It is possible that the list given might have to be reduced when the telephone circuit is already subject to considerable disturbance due to an adjacent power line.

6. The increase in crosstalk produced by infra-acoustic telegraph installations must be determined in the following way:

The cable quads are replaced by artificial lines which are free from crosstalk and which reproduce, as far as possible, the circuit impedances (terminating sets for quads). Under these conditions,

¹⁾ The question of defining noise voltage, of measuring its size and of the limits to be set for disturbance noises from various sources produced on telephone circuits is being studied, and is the subject of experiments by the Joint International Experimental Committee for the protection of telecommunication lines and underground conduits.

the attenuation corresponding to the crosstalk measured in the telephone exchange must not be lower than the following values:

- a) for 4-wire circuits : 7.5 nepers or 65 decibels for crosstalk between any 2 conversation circuits in a single quad;
 - b) for 2-wire circuits : 8.5 nepers or 74 decibels for crosstalk between any 2 conversation circuits in a single quad;
 - c) for 4-wire and 2-wire circuits : 10 nepers or 87 decibels for crosstalk between 2 conversation circuits belonging to different quads.
7. After the connection of simultaneous telegraph installations, the unbalance relative to the ground of telephone circuits must not exceed the value laid down for it by the C. C. I. F.
 8. The circuits specially used for the relay of broadcasting transmissions must not be assigned to simultaneous telegraphy, the low frequencies being suitable for good reproduction of music.
 9. The increase in crosstalk produced by simultaneous telegraph installations (phantom circuits) must not exceed a value corresponding to a reduction of crosstalk attenuation of 0.5 nepers.

Recommendation No. 452. Grounding of installations connected to a long-distance cable circuit

The C. C. I. T.,

considering

that the C. C. I. F. Recommendation relating to the grounding of a long-distance cable telephone line (White Book, Volume II, page 23) applies to direct current telegraphy;

that, in many cases, the induced voltages to be expected in long distance telephone cables with grounded telegraph installations are today still low enough for no disruptive discharge between wires to be feared and for condition 3 b) of the above Recommendation thus to be fulfilled;

that, in addition, because of the development of high tension networks and the electrification of railways, it may be feared that induced voltages may in the future cause disruptive discharges between wires;

that it is not yet known which method is most advisable for the wiring of direct current telegraph installations in order to satisfy conditions 2 and 3 of the above Recommendations,

unanimously declares the view

1. that it is advisable not to ground at any point in a long-distance cable circuit;
2. that, as a general rule, it is advisable not to ground at any point in an installation (telephone or telegraph) which is connected by metal to a long-distance cable telephone circuit;
3. that if, however, for special reasons, it is necessary to ground an installation directly connected to the conductors of a cable, it is necessary to take the following precautions :
 - a) the grounding must be carried out in such a way that the balance of the circuits in relation to the ground and to adjacent circuits is not disturbed;
 - b) the disruptive voltage of all the other conductors of the cable together, in relation to the circuit connected to ground, must be appreciably higher than the highest voltage which, as a result of induction from adjacent power lines, could exist between these conductors and the circuit connected to ground;
4. that the most advisable and economical method of avoiding grounding (2) or the danger of such grounding (3 b)) must be found for the wiring of direct current telegraph installations;
5. that an investigation must be made, for wirings which have grounding at present, to ascertain whether condition 3 b) will continue to be satisfied in the event that new distribution networks or new electric railway lines are put into operation, in which case suitable measures must be taken.

Recommendation No. 511. Standardization of harmonic frequency multiplex telegraphy

The C. C. I. T.,

considering

that it is desirable that certain data relating to harmonic frequency multiplex telegraphy in international use be uniformly established;

that there are cases, for, example that where 2-wire circuits are used, where it is not possible for the apparatus at one of the ends to be operated at the same frequency in the outgoing and incoming channels,

unanimously declares the view

1. that it is advisable to adopt for international telegraphy, the series of frequencies formed by uneven multiples of 60, the lowest frequency being 420 c/s;

2. that, however, in special cases (for example circuits using long submarine telegraph cables on a section of their route), the Administrations concerned may agree upon the use of a different series of frequencies;

3. that the frequencies produced by the alternating current generators should not deviate by more than 6 c/s from the nominal value when the telegraph channels supplied are operating over a telephone circuit composed exclusively of audio-frequency sections, and not more than 3 c/s in other cases;

4. that the power levels of carrier waves transmitted on the line and measured successively in as short a period as possible should not differ from one another by more than 0.2 neper when they are operating on a constant impedance;

5. that the power of each of the carrier waves transmitted on the line should not vary in operation by more than ± 0.1 neper when it operates on a constant impedance;

6. that the envelope of the current transmitted to the line should have a slope of about 10 % of the steady state amplitude per millisecond at the moment when, on its first rise, its ordinate reaches a value equal to half its steady state of amplitude;

7. that it must be possible to subject any channel to a test without withdrawing from service a channel other than the return channel of the circuit planned;

8. that local tests must be made at each of the ends before making the two terminal exchanges work together, if this is necessary;

9. that, in graded harmonic frequency telegraphy, it is desirable that the same frequencies be used separately for circuits established on different successive sections of a 4-wire circuit;

10. that, in graded harmonic frequency telegraphy, the attenuation of the filters which pass a group of frequencies must, in the suppressed frequency band, be higher by at least 4 nepers than that shown in the transmission band;

11. that, in graded harmonic frequency telegraphy, in order to facilitate local tests, the frequencies used for communications set up between two international exchanges in one direction, should also be used in the opposite direction, if possible.

Recommendation No. 512. Standardization of the method of modulation in harmonic frequency telegraphy

The C. C. I. T.,

considering

that it is possible, in the present state of harmonic frequency telegraphy, to recommend a uniform method of modulation,

unanimously declares the view

that it is to be recommended that harmonic frequency telegraphy should be operated in such a way that the current is transmitted on the spacing position circuit.

*** Recommendation No. 514. Reserve circuits for V. F. telegraphy**

(New text in conformity with Provisional Recommendation II/18)

The C. C. I. T.,

considering

that it is expedient to standardize some of the methods to be adopted for replacing defective 4-wire circuits in V. F. systems;

that, although it does not appear necessary for these methods to be the same in details in every country, it would be advisable to reach agreement regarding the general directives to be followed;

that the use of circuits on carrier telephone systems for V. F. telegraphy is expected to become general in the future;

that it would be of interest if the curves showing the differences in relative power levels, in relation to frequency, between the normal voice-frequency telegraph circuit and its reserve circuit at the sending end and receiving end respectively, should not differ at any frequency by more than 0.2 neper, so that when a voice-frequency telegraph system is switched to its reserve circuit, there should be no variation in power level causing excessive distortion in the voice-frequency telegraph system, especially for the upper and lower frequencies in the frequency band transmitted;

that, the telephone network being what it is, no such limitation can be guaranteed. Generally speaking, the voice-frequency telegraph circuit and its reserve circuit are made up differently, and it often happens that one is an audio-frequency circuit while the other is a telephone channel of a carrier-system. Although adjustments can be made to the "equivalent frequency" curve of an audio-frequency circuit, it is difficult to modify the curve in the case of a telephone channel in a carrier-system, since it depends essentially on the filter characteristics of the carrier-system,

declares the view

a) that it is recommended :

1. that a telephone circuit should be designated as the reserve circuit for each circuit used in systems of voice-frequency telegraphy;

2. that this reserve circuit should, whenever possible, be routed differently from the normal circuit;

3. that the maintenance measurements to be taken on telephone reserve circuits should be the same as those carried out on normal voice-frequency telegraph circuits and that special arrangements should therefore be devised for the maintenance of these circuits;

b) that it is desirable for the changeover from the normal voice-frequency telegraph circuit to the reserve circuit should take place, if possible, without interruption, it being generally understood that in the future many telegraph channels will be connected to switched networks;

c) that, with this aim in view, it is recommended :

1. that the normal voice-frequency circuit and the reserve circuit should pass through the same changeover point situated at each of the terminal stations concerned;

2. that the changeover should be effected at two points situated at the same relative telephone power level on the normal voice-frequency telegraph circuit and on the reserve circuit;

3. that the procedure to be adopted for the changeover from the voice-frequency telegraph circuit to the reserve circuit and vice-versa should be jointly agreed upon by both Administrations or Private Operating Agencies concerned;

- d) that, should breakdowns occur simultaneously both in the normal voice-frequency telegraph circuit and the reserve circuit, the technical departments of the Administrations or Private Operating Agencies should take immediate joint action to find a temporary remedy;
- e) that from the point of view of the distortion which may occur in certain telegraph channels of voice-frequency systems, it would be desirable that there should be the greatest possible similarity between the curves showing differences in relative power levels in relation to frequency, between the sending and receiving ends respectively of the normal circuit and the reserve circuit, when the changeover takes place between a circuit used for voice-frequency telegraphy and its reserve circuit.

*** Recommendation No. 516. Coexistence in the same cable of telephony and harmonic frequency telegraphy**

(Amended according to Provisional Recommendation II/17)

The C. C. I. T.,

considering

that the coexistence of telephony and harmonic frequency telegraphy in a single cable presents no obstacle, particularly as far as crosstalk is concerned, when the total power of the telegraph currents is kept below a certain limit;

that the C. C. I. F. has studied the conditions of coexistence of telephony and harmonic frequency telegraphy (Yellow Book, Volume III, page 156),

unanimously declares the view

that harmonic frequency telegraph installations should satisfy the following conditions :

The total power of telegraph currents corresponding to the frequencies simultaneously used on a single circuit must not exceed 5 milliwatts at the point of relative level zero calculated from the power level diagram of the telephone circuit.

As the harmonic frequency telegraph transmitter is not, in the majority of cases, connected to the input of the telegraph circuit, an absolute level p differing from zero is generally operative at the beginning of the circuit used for harmonic frequency telegraphy. The maximum power permissible at the input of the circuit used for harmonic frequency telegraphy thus rises to

$$N_{\max} = 5 e^{2p} \text{ milliwatts};$$

The maximum voltage for an impedance Z of the circuit is thus

$$E_{\max} = (5 \cdot 10^{-3} e^{2p} Z)^{1/2} \text{ volts} = e^p \sqrt{\frac{Z}{200}} \text{ volts.}$$

This voltage will not be exceeded, if, for any of the n frequencies, the voltage does not exceed the n th part of E_{\max} :

$$\begin{aligned} E_f &= \frac{1}{n} e^p \sqrt{\frac{Z}{200}} \text{ volts,} \\ &= \frac{1}{n} e^p \sqrt{\frac{Z}{600}} \sqrt{3} \text{ volts,} \\ &= \frac{1}{n} e^{p + \log_e} \left(\sqrt{\frac{Z}{600}} \sqrt{3} \text{ volts} \right), \end{aligned}$$

or, introducing the absolute voltage level p_s in the place of the absolute power level p ,

$$E_f = \frac{1}{n} e^{p_s} \sqrt{3} \text{ volts.}$$

The measurements are taken during transmission of a continuous dash on each frequency in the circuit one after the other. For this purpose, each generator is adjusted in such a way as to attain, for each frequency, the voltage level indicated above. The measurement of the voltage which is to be taken at the input of the circuit used for multiplex harmonic frequency telegraphy may be taken with any standard voltmeter.

If a normal level measuring apparatus (transmission measuring set) is used, calibrated for absolute levels, and the voltage at the zero level is equal to 0.775 volt, this apparatus will show $\log_e (E_f / 0.775)$.

Thus we have :

$$\log_e \frac{E_f}{0.775} = p_s + \log_e \sqrt{\frac{3}{0.775}} - \log_e n.$$

The value of the absolute level which is not to be exceeded when the transmission voltage is adjusted therefore rises to :

$$p_{\text{meas}} = p_s + 0.8 - \log_e n.$$

If the voltage level rises at the input of the harmonic frequency telegraph circuit to $p_s = 0.7$ neper, for example, it will be necessary to make adjustments according to the following measurement scale :

3-channel system : $p_{\text{meas}} = 0.7 + 0.8 - \log_e 3 = +0.4$ neper

6-channel system : $p_{\text{meas}} = 0.7 + 0.8 - \log_e 6 = -0.3$ neper

12-channel system : $p_{\text{meas}} = 0.7 + 0.8 - \log_e 12 = -1.0$ neper

considering furthermore

that the C. C. I. F., in close consultation with the C. C. I. T., has studied the conditions to be fulfilled by international telephone circuits used for V. F. Telegraphy and the maintenance measurements to be made on such circuits,

and that C. C. I. F. has issued recommendations on these matters,

unanimously declares the view

that it can agree to the C. C. I. F. recommendations on these matters contained in the Yellow Book, 1949, Volume III, pages 156 and 255, as amended by the new texts proposed in the Document of the 3rd C. E., C. C. I. F. (London 1951) : "réponse à la question 42".

These amended recommendations are reproduced in the Annex.

Annex

1. In V. F. telegraphy it is preferable to use four wire circuits.

The type of load to be carried depends on the number of carrier frequencies to be transmitted. For instance, for systems in which the number of channels is not greater than 12, the medium load may be carried even for long distance transmissions, whereas for systems employing 18 channels instead of 12, circuits with a load lighter than the medium load should be used.

With two wire circuits two way operation (duplex) would be impossible because these circuits cannot be balanced with sufficient accuracy to avoid mutual interference. However, a two wire circuit may be used for V. F. telegraphy if low frequencies are used for transmission in one direction and high frequencies for transmission in the other direction.

2. A four wire circuit used for V. F. telegraphy differs in composition from a four wire telephone circuit owing to the absence of four wire terminations and echo suppressors.

Points A and B (figure 1) at which the circuit used for V. F. telegraphy is switched to its reserve circuit (conventionally considered as the input and the output of the four wire circuit used for V. F. telegraphy) should respectively be at the same relative levels in these two circuits, such levels being determined by the hypsogram of the telephone circuit.

The relative level at point A should not exceed -0.4 neper.

The relative level at point B should be at least $+0.4$ neper.

a) The graph in figure 2 shows for the different frequencies what are the variations, in relation to the nominal value of 800 c/s, of the difference in the relative power levels between the input and the output of the circuit (point A and B).

b) The permissible tolerances for the relative power level at the output of frontier repeaters correspond to those laid down for 4 wire telephone circuits, assuming that, in making maintenance measurements, a power equivalent to 1 milliwatt at the point of zero relative level deduced from the hypsogram of the telephone circuit is applied at the input of the circuit used for V. F. telegraphy.

These tolerances are shown in the graph given in figure 3 attached.

It seems unnecessary to lay down special tolerances for the variations, in terms of the frequency, of the through level measured at the output of a frontier repeater since this figure can easily be calculated on the basis of the permissible tolerances for the relative power level.

c) The relative power level at the point where the V. F. circuit, at the reception end, is switched to its reserve circuit must remain as constant as possible in time. Moreover, any interruption of the circuit, however short, is harmful to telegraph transmission. Great care should therefore be exercised when taking measurements on circuits and repeaters, when switching batteries, etc. To draw the attention of staff to this point, the circuits used for V. F. telegraphy should be specially marked in terminal offices and in repeater stations.

d) Special steps should be taken to ensure that no modulation is caused on circuits and in repeaters. Such modulation might be caused, inter alia, by fluctuations of battery voltages, or by the connection of sub-audio telegraphy equipments to the conductors of the cable.

3. Recommendations applicable to the establishment and maintenance of four-wire telephone circuits are also applicable to circuits used for V. F. telegraphy. Maintenance measurements, however, are confined to measurement of equivalent and level in the frequency band used for V. F. telegraphy.

Periodical measurements at 800 c/s should be taken at the same intervals recommended for international telephone circuits, i. e. monthly for circuits with less than 15 repeaters, and weekly for circuits with more than 15.

Measurements at different frequencies should be taken half-yearly. All these measurements should be taken by applying, at the input of the circuit used for V. F. telegraphy, a power corresponding to 1 milliwatt at the point of zero relative level deduced from the hypsogram of the telephone circuit.

The frequencies for measurements are as follows :

Circuits permitting the use of 18-frequency systems : 300, 500, 800, 1400, 2000, 2200, 2400, 2600 c/s.

Circuits permitting the use of 24-frequency systems : 300, 500, 800, 1400, 2000, 2400, 2800, 3000, 3200, 3300 c/s.

It is advisable to take maintenance measurements on the reserve circuits at the same time as those taken on the normal circuit for V. F. telegraphy.

The maintenance measurements to be taken on the telegraph channels of international V. F. telegraphy systems only concern telegraphy services.

For maintenance measurements on the circuits, the documents normally used for telephone maintenance measurements will be employed.

For measurements on the channels of V. F. telegraphy systems, the telegraph services are entirely responsible for deciding what documents are to be exchanged.

Measurements on switched telegraph circuits (including telex circuits) only concern the telegraph services.

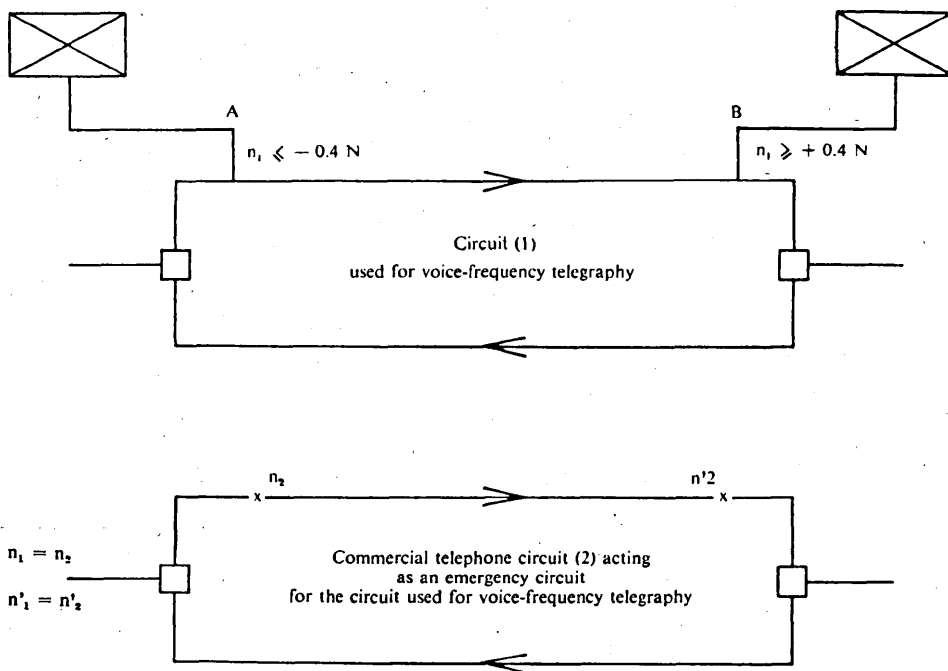
V. F. telegraphy transmitting
apparatusV. F. telegraphy receiving
apparatus

Fig. 1. — Diagram of a circuit used for V. F. telegraphy (1) and of its reserve circuit (2).

A and B Points of:

- 1) connection between the telephone circuit used for VF telegraphy and the VF telegraphy equipments
- 2) switching from the circuit used VF telegraphy to its reserve circuit.

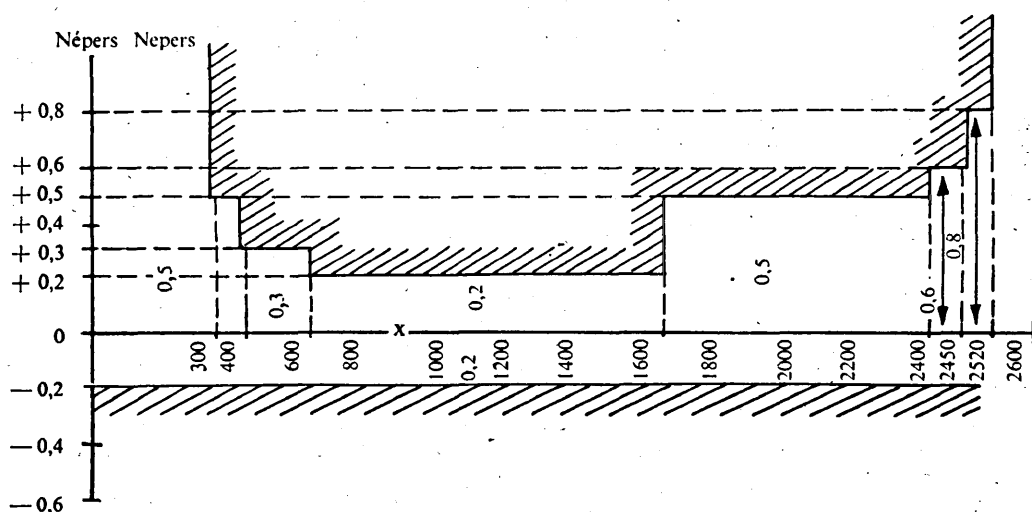


Fig. 2. — *Graph. No. 2.* — Limits for the variation, as a function of frequency, in relation to its nominal value at 800 c/s, of the difference of relative power levels between the origin and the extremity of a circuit used for voice-frequency telegraphy (telephone circuit with passband of 300 — 2,600 c/s).

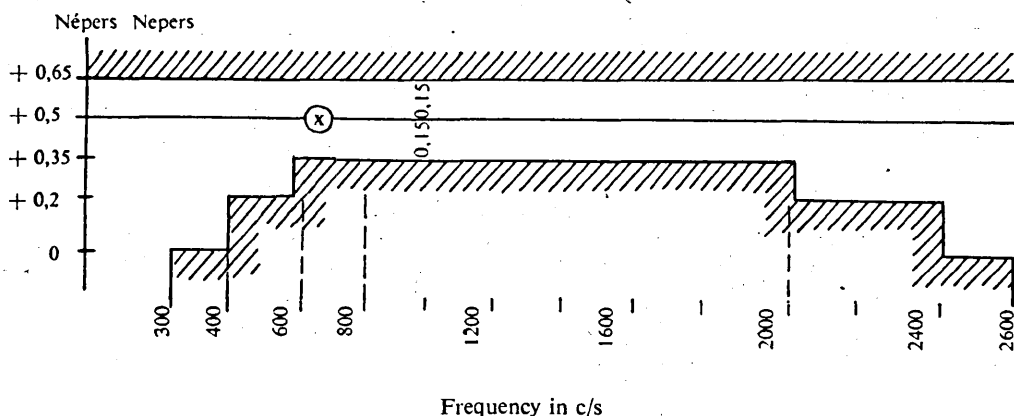


Fig. 3. — *Graph. No. 3.* — Limits for the absolute power level on the occasion of maintenance measurements at the output of a frontier-repeater (frontier side) of an international circuit with passband 300 — 2,600 c/s used for voice-frequency telegraphy, a power corresponding to 1 milliwatt at the point of zero relative level (as deduced from the hypsogram of the telephone circuit) being applied at the origin of the voice-frequency telegraph circuit.

(516)



Recommendation No. 518. Voice frequency telegraphy on carrier telephone circuits

The C. C. I. T.,

considering

that a reply has been given by the Sub-Committee on Urgent Transmission Questions to the transmission question No. 30 of the C. C. I. F., relating to telegraphy carrier on telephone channels, in the course of its meeting in Paris (May 1947);

that an effort has been made in carrier telephone equipment to ensure a maximum difference of 4 c/s between the frequency applied at one end of a carrier telephone channel and the frequency restituted at the other end,

unanimously declares the view

that it can agree to the Draft Reply which has been submitted to it by the Sub-Committee on Urgent Transmission Questions and which is reproduced in Annex;

that the attenuation characteristic proposed may give rise to difficulties in the case of frequencies higher than 3,000 c/s, and that practical experience must be gained regarding the quality of telegraph transmission above this frequency;

that paragraph 3 of Recommendation No. 511 relating to the standardization of V. F. multi-channel telegraphy should be amended¹;

that, to achieve this stability of carrier frequencies, Administrations should consider a new type of V. F. generator (rotating machine, valve oscillator or tuning-fork ...);

that C. C. I. F. Question No. 30 is also within the competence of the C. C. I. T. and that, as such, it should be studied in the following form:

"What are the essential characteristics to be imposed on carrier telephone channels (e. g. 12-channel systems on cables, open wire lines or coaxial systems) so that they may be utilized for V. F. telegraphy?"

that telephone circuits composed solely of audio frequency sections do not require a higher stability of the V. F. telegraph carrier frequencies than that indicated in paragraph 3 of Recommendation No. 511.

ANNEX

The Sub-Committee has taken note of the observations of the different Rapporteurs of the International Telegraph Consultative Committee (C. C. I. T.) and of the observations of the different telephone Administrations with regard to the draft recommendations of the XIVth Plenary Assembly of the C. C. I. F. on the use of carrier current telephone channels for Voice Frequency Telegraphy.

Telegraph Power.

Generally speaking, the limit of 9 microwatts for telegraphic power at the relative zero level point appears to be acceptable, and would allow of 24 telegraph channels (each operating at 50 bauds) per telephone channel. A telephonic channel may, however, show a comparatively high noise level, in which case the telegraph service will have to reduce from 24 to 18 the number of telegraph channels used on the telephonic channel. The maximum limit acceptable for telegraph power on each telegraph channel will then be

$$\frac{5 \text{ milliwatts}}{(18)^2} = \text{approximately 15 microwatts, instead of}$$

$$\frac{5 \text{ milliwatts}}{(24)^2} = 9 \text{ microwatts}$$

¹) Note of the B. U.: Recommendation No. 511 has been amended accordingly.

Band of frequencies actually transmitted.

The Sub-Committee proceeded to an exchange of views concerning the advisability of fixing higher limits for curve of the "frequency equivalent" characteristic or for the curve of the characteristic "group propagation time frequency". Practical experience has shown that the introduction of a similar additional clause into the C. C. I. F. specifications is not required for the supply of carrier current systems, even when a telegraphic connection consists in a "cascade" connection of telephone channels with carrier currents from different systems. Some telephone channels in the case of a communication of this kind might accidentally not be of adequate quality to supply 24 telegraph channels. In such cases there will always be the alternative of making better telephone channels available for the telegraph service.

Conclusion.

The Sub-Committee hopes that the International Telegraph Consultative Committee will see its way at its next Plenary Assembly to effective acceptance of the provisional directives of the XIV A. P. of the C. C. I. F. with regard to the use of carrier current telephone channels for V. F. Telegraphy, as contained in Part V, Section 2 of the draft text of Volume II of the C. C. I. F. Yellow Book for 1947.

On the other hand the Sub-Committee wishes to draw the attention of the C. C. I. T. to the desirability of systematic co-operation between Study Group XI of the C. C. I. T. dealing with questions concerning start-stop telegraph subscribers' service and the Joint Committee of the C. C. I. F. for the general programme of European telephone interconnection.

Provisional Recommendation No. II/15 (519). Recommendation on the transmitted power for voice frequency telegraph systems

The C. C. I. T.,

considering

that the C. C. I. F. has announced the psophometric potential difference provisionally admissible on telephone circuits (C. C. I. F. Yellow Book, page 38, Volume III, Paris 1949);

that the C. C. I. F. has also given figures for the maximum total power of telegraph currents which may be transmitted over a circuit (C. C. I. F. Yellow Book, pages 155 and 161 of Volume III, Paris 1949);

that the receiver sensitivity of systems of voice frequency telegraphy varies,

declares the view

that the standard transmitted power for voice frequency telegraph systems of up to 24 channels should be 9 microwatts at points of zero relative level in the circuit;

that when a circuit has a relatively high noise level, the number of telegraph channels should be reduced and the transmitted power per channel should be increased up to the maximum admitted by the C. C. I. F.

**Provisional Recommendation No. II/8 (520). Permissible limits
for the degree of distortion on an international V. F. telegraph channel**

The C. C. I. T.,

considering

that the numerous tests made on V. F. telegraph equipment in service now make it possible to establish limits for the degree of distortion outside which a V. F. telegraph channel must be regarded as being out of order;

that, in accordance with Recommendation No. II/5, such tests must be made on 1/1, 2/2, 1/6 and 6/1 signals and on text signals, at a modulation rate of 50 baults;

that, the results of measurements on 6/1 and 1/6 signals depend, to a very large extent, on the receiving equipment and therefore do not permit a general recommendation to be given;

that, when equipment is put into service and when it is adjusted, the minimum distortion should be sought and therefore limits for the degree of distortion need not be established in this case,

recommends

1. that the degree of service distortion on an international V. F. telegraph channel obtained with measurements on 1/1 or 2/2 signals should not exceed 4 %;

2. that the degree of rhythmic service distortion of an international V. F. telegraph channel on the standardized text should not exceed 10 %;

3. that the limits for the degree of distortion obtained on an international V. F. telegraph channel with measurements on 6/1 and 1/6 signals should when desired be established by Administrations according to the receiving equipment used.

These limits are for a modulation rate of 50 bauds, and take account of the accuracy of the measuring equipment.

They are provisional and may be amended according to the technical development of V. F. telegraphy and of studies of telegraph distortion.

**** Recommendation No. 521. Frequency of carrier currents for the telegraph service
by start-stop apparatus between telephone subscribers**

(Cancelled. See Draft Recommendation II/10 (531))

**** Recommendation No. 523. Precautions to be taken in telephone installations
in order to avoid disturbance in telegraph transmission**

(Cancelled. See Draft Recommendation II/10 (531))

**** Recommendation No. 524. Sending and receiving equipment for 1500 c/s carrier current**

(Cancelled. See Draft Recommendation II/10 (531))

**Provisional Recommendation No. II/10 (531). Telegraph transmission
on rented international telephone circuits**

The C. C. I. T.,

considering

that the C. C. I. F. has issued recommendations on the subject of telegraph transmission on rented international telephone circuits, vide C. C. I. F., Yellow Book, Volume III, 1949, page 163 and its Annex No. 19,

declares the view

that it can adopt this text which is reproduced hereafter.

(Yellow Book, Vol. III, page 163.)

(Annex No. 19, p. 67 of Annexes to Vol. III of Yellow Book.)

1. The frequency of 1500 c/s is recommended for private telegraph transmissions between telephone stations permanently connected by rented international circuits.

2. In the case of an audio circuit, a maximum power of 50 milliwatts (i. e. an absolute power level of 0.8 nepers or 7 decibels) at the zero relative level point may be admitted for the steady telegraph emission of a continuous dash.

In the case carrier current channels, the power (measured as above) must not exceed 0.3 milliwatts (corresponding to an absolute power level of 0.6 nepers or about 5 db down) at the zero relative level point.

When renting an international telephone circuit that might be used for such telegraph transmissions, it is advisable to ensure, by measurements, that this limit is not exceeded.

Administrations and private operating agencies concerned are responsible, as regards their own national networks, for taking the necessary precautions to avoid interference to their domestic telephone services from such telegraph transmissions. Such precautions may consist in limiting the telegraph transmission power or the duration of use of telegraphy, or may concern the method of telegraph transmission.

For information, the annex lists the precautions that various countries propose taking in this respect.

3. V. F. ringing sets on telephone circuits rented for private telegraph transmissions between two permanently connected telephone stations, must be insensitive to telegraph signals. It has been observed that one existing type of ringing set is sensitive to them, but measures may be taken to correct such ringing sets so that there is no great difficulty for the frequency chosen.

4. The maximum limit of 250 milliseconds adopted for the hangover time of echo suppressors on international telephone circuits does not appear long enough to suppress (even partially) the transmission of the answer-back signals when start-stop apparatuses reply.

ANNEX

Precautions that various countries propose taking to obviate the risk of interference to their national networks from private telegraph transmissions between two telephone stations permanently connected by a rented international circuit

French telephone administration.

The power of the telegraph transmitter installed in the subscriber's premises can be fixed in relation to the attenuation of the line separating it from the starting point of the long distance circuit and on the basis of para. 2 of the C. C. I. F. Recommendation on the subject.

United Kingdom telephone administration.

The admissible power for the telegraph transmitter installed in the telephone subscriber's premises is limited by the cross talk in the local distribution network. The decisive factor in imposing this limit is the power applied at the input of the rented national circuit in some cases between the subscriber and the input of the rented international circuit, especially if the national circuit consists of a carrier current channel, in which case, if too high a power is applied at this point, interferences on a large number of national circuits may result. It is advisable for the managing staff of the repeater station involved to take special measurements when such telegraph systems are first installed, to ensure that the power applied at the input of the national trunk circuit is below an appropriate level.

Netherlands telephone administration.

It is assumed that there is a maximum attenuation of 12 db between the telegraph transmitter and the input of the long distance liaison using an international carrier current telephone circuit. In this case, the transmitter should be capable of supplying an absolute level not higher than $+12 - 5 = 7$ db. Thus, for a resistance of 600 ohms, we would obtain outputs of 1.7 volts at most. For subscribers situated closer to the input of the long distance circuit, the transmission level should be progressively lowered, by steps of 3 db for example. Each country could choose a transmission level appropriate to the construction of its network. With this reduction by steps of 3 db, the transmitter power could still vary from simple to double.

Recommendation No. 546. Coexistence of telephone and supra-acoustic telegraph on the same conductors of a cable

The C. C. I. T.,

considering

that the C. C. I. F. has asked it to examine the question of whether the employment, for telegraphy, of frequencies between the maximum frequency necessary for telephony and the cable cut-off frequency may be recommended;

that experience in various countries has shown that the coexistence of telephony and supra-acoustic telegraphy gives satisfactory results if the supra-acoustic telegraphy is operated under certain conditions;

that it will be necessary for the international service to fix the carrier frequencies;

that it is desirable for these frequencies to belong to the series of frequencies fixed for harmonic telegraphy;

that supra-acoustic telegraphy will demand special rules for the maintenance of telephone circuits;

that the cases where cable circuits contain one or more high-frequency telephone channels, as well as the ordinary telephone channels, should be considered separately,

unanimously declares the view

1. that, in the international service, the employment of a supra-acoustic telegraph channel may be allowed on a lightly loaded telephone cable in a circuit containing no high-frequency telephone channel (carrier current telephony), under the following conditions:

At no point in the circuit shall the power of the telegraph currents be greater than that which results at the same point, from the introduction of a standard generator (1 mW at 800 c/s on 600 ohms) at the input of the telephone circuit.

The increase in the attenuation of the telephone circuit due to the connection of the ultra-acoustic telegraph installations must not be greater than the following provisional values for a filter combination (a telephone filter and a telegraph filter):

from 300 to 1600 c/s	0.06 neper
from 1600 to 2400 c/s	0.10 neper
from 2400 to 2700 c/s	0.20 neper

The modification of circuit impedance as a result of the connection of ultra-acoustic telegraph installations should not be greater than the following provisional values :

from 300 to 2400 c/s	10 %
from 2400 to 2700 c/s	20 %

The disturbances produced in the telephone circuit by ultra-acoustic telegraphy must be sufficiently reduced for the psophometric voltage (measured objectively on 600 ohms) to be no greater than one millivolt at 1 neper below the relative level; however, it is possible that this limit should be reduced when the telephone circuit is already subject to a strong disturbing influence due to a neighbouring power line.

It is necessary to provide shunting devices for the supra-acoustic channel at the points of the telephone circuit where echo-suppressors are inserted;

2. that it is advisable to chose 3180 c/s or 3540 c/s as the carrier current frequency, the first only when the operation is making use of telegraph apparatus whose transmission speed is limited to 50 bauds;

3. that the C. C. I. F. should be informed of the results obtained and invited to examine the problems arising from maintenance and supervising devices (insertion of low pass filters) of telephone circuits which include supra-acoustic telegraph channels.

*** Recommendation No. 547. Coexistence in the same cable
of telephony and supra-acoustic telegraphy**

(Recommendation amended in conformity with Provisional Recommendation No. II/20)

The C. C. I. T.,

considering

that this process provides only one telegraph channel, in addition to the telephone channel, and that it can only be applied in comparatively few cases (lightly loaded, or unloaded circuits, which cannot be used for multi-channel carrier telephony);

that in such cases, the Administrations and private operating agencies concerned could in most cases by common agreement contemplate the possibility of making use of some other more suitable process, which would provide, in addition to the V. F. telephone channel more than one telegraph channel,

declares the view

that the use of supra-acoustic telegraphy should not prejudice the quality of transmission over the adjacent telephone channel and that, in particular, it should not limit the band of frequencies necessary for good speech reproduction (300 to 3400 c/s at least);

**Recommendation No. 556. Coexistence of carrier-current telephony
and supra-acoustic telegraphy**

The C. C. I. T.,

considering

that there are special cases in which supra-acoustic telegraph systems are used on telephone lines containing several telephone channels (especially on aerial lines);

that sufficient information has not yet been obtained for establishing general rules for such coexistence;

that, in present circumstances, it is useless to establish such rules, because carrier-current telephony is passing through a phase of rapid development,

unanimously declares the view

that, in present circumstances, it is not advisable to establish rules concerning supra-acoustic telegraphy on circuits containing several telephone channels.

Note : In this Recommendation the expression " supra-acoustic " does not apply to harmonic telegraph systems which employ a complete telephone circuit on carrier-current.

Provisional Recommendation No. II/14 (557). Utilisation of the inter-channel frequency band of carrier telephone circuits for telegraph transmission

The C. C. I. T.,

declares the view

that in the present state of technical development the utilisation of the inter-channel frequency band of carrier telephone circuits for telegraph communication is neither technically nor economically desirable.

**** Recommendation No. 581. High-Speed phototelegraphic transmissions**

(Cancelled by the new recommendation No. 584)

Provisional Recommendation No. IV/1 (582). Transmission of half-tone pictures over combined radio and metallic circuits

The C. C. I. T.,

considering

1. That the C. C. I. R., in its meeting at Stockholm in 1948, has studied the matter of the transmission of half-tone pictures over H. F. radio circuits and over H. F. radio circuits and metallic circuits combined.

2. That the C. C. I. R. has, as a result, issued recommendations contained in Recommendation No. 25 contained in the book of recommendations issued by that meeting,

agrees with these recommendations, and declares the view :

in order to transmit half-tone pictures over combined radio and metallic circuits :

1. That over the radio path the sub-carrier frequency modulation system be used with the following characteristics :

- | | |
|---|----------|
| a) Sub-carrier frequency | 1900 c/s |
| White frequency | 1500 c/s |
| Black frequency | 2300 c/s |
| b) Stability of frequencies should not be less than | |
| Instantaneous | 8 c/s |
| During 15 minutes | 16 c/s |

2. That, for the present, the following characteristics be used :

	a)	b)
Index of co-operation	352	264
Speed of rotation of cylinder in		
r. p. m.	60	90

3. That direct frequency modulation of the radio carrier by the picture modulation frequencies could result in a greater signal to noise ratio for a given transmitter, and that the perfecting of this system be studied (by the C. C. I. R.).

Remarks

It is the understanding of the Delegation of the United States that the recommendations relating to standards for phototelegraph equipment are not intended to require the imposition of such standards upon private users who use their own equipment for the transmission of pictures over private circuits.

Provisional Recommendation No. IV/2 (583). Transmission of half-tone pictures over combined radio and metallic circuits

The C. C. I. T.,

considering

1. that the C. C. I. R. has recommended that the system known as sub-carrier frequency modulation should be used in the operation of the transmission of pictures by H. F. radio over the radio path of a combined radio and metallic circuit;

2. that the method of operation whereby the radio carrier is frequency modulated directly by the picture modulation frequencies should be studied, since it would result in an enhanced signal to noise ratio for a given radio transmitter;

also

3. that the C. C. I. F. has, as yet, not finalised on the method of voice-frequency signalling to be recommended for use over international telephone circuits;

4. that a method whereby a single frequency is used for such signalling appears to be incompatible with the concurrent operations of phototelegraphy by the method of sub-carrier frequency modulation occupying a frequency band including that of the signalling frequency;

declares the view

1. that the C. C. I. F. should be asked to give its opinion as to the conditions under which their transmission of pictures by the method of transmission known as sub-carrier frequency modulation, would be possible over international telephone circuits. (In such transmissions it should be noted that there is the possibility of the sustained transmission of any one of the frequencies within the frequency band required for the transmission of the picture.);

2. that the use of amplitude modulation shall be the normal method for the transmission of pictures over international telephone circuits, and that, where metallic and radio paths are combined in a picture circuit, the translation from amplitude to sub-carrier frequency modulation shall be carried out at the junction of the radio and metallic paths;

3. notwithstanding what is contained in 2 above, it shall be allowable, in special cases, and particularly where service is permanently point-to-point, that, where the line conditions permit, the system of sub-carrier frequency modulation may be employed throughout the circuit.

* Recommendation No. 584. Transmission of half-tone pictures over combined radio and metallic circuits

(New text in conformity with Provisional Recommendation No. IV/3)

The C. C. I. T.,

considering

1. that the C. C. I. T., at its meeting in Brussels, declared the view that a joint C. C. I. T. and C. C. I. R. Study Group should study

- a) what method should be chosen for transmission over radio circuits, and what frequencies should be used with this method,
 - b) what new speeds of rotation, new indices of co-operation and new dimensions of drum should be standardised,
 - c) what should be the relations between the deviation of frequency and the intensity of light reflected from the subject being transmitted when the system of frequency of modulation is chosen;
2. that the C. C. I. R., at its meeting in Stockholm, in Recommendation No. 25 agreed that a mixed commission of the C. C. I. T. and C. C. I. R. be established to study and make recommendations for the standardisation of characteristics including :
- a) cylinder dimensions;
 - b) alternative speeds of rotation;
 - c) effects of land-line characteristics in the case of transmission over combined metallic and radio circuits;
 - d) desirable relation between picture light density and deviation frequency in the system of frequency modulated sub-carrier;
3. that from a consideration of the limitations of the etheric path, the C. C. I. R. has decided upon the method of transmission to be used over the radio path, and the frequencies to be employed, and also upon the indices of co-operation and the corresponding speeds of rotation of the drum;
4. that the C. C. I. T. has resolved to obtain the opinion of the C. C. I. F. as to the possibility of transmitting pictures by the method of sub-carrier frequency modulation over international telephone circuits,

declares the view

that a mixed *study group C. C. I. T., C. C. I. R.* should be set up to study, in connection with the transmission over combined radio and metallic paths.

1. Drum dimensions.
2. Alternative speed of rotation.
3. Desirable relation between picture light density and deviation frequency in the system of sub-carrier frequency modulation.

Note. *This Recommendation replaces Recommendations No. 581 and 584 (Brussels 1948).*

Recommendation No. 586. Coexistence of telephony and phototelegraphy in the same cable

The C. C. I. T.,

unanimously declares the view

that telephone circuits used for phototelegraphy should fulfil the following supplementary conditions :

1. Two-wire circuits have no practical value for transmitting pictures, owing to reaction coupling phenomena (see 4).

In the normal four-wire arrangement, the circuit can be used each time for transmission in only one direction or the other; in this case it is generally necessary to employ echo suppressors in order to eliminate reaction coupling phenomena. To be able to transmit simultaneously in both directions, the terminating sets and echo suppressors must be disconnected.

2. The conditions relating to the transmission equivalent of four-wire circuits used for the telegraphic transmission of pictures are, in general, the same as in the case of telephony.

- a) The attenuation between main trunk centres should not exceed 1.3 neper or 11 decibels.
- b) The attenuation between phototelegraph centres should not exceed 3.3 nepers or 29 decibels.
- c) The attenuation distortion between phototelegraph centres should not be greater than 1.0 nepers or 11 decibels in the band of frequencies transmitted in phototelegraphy. As a distortion of 1.0 neper or 9 decibels is already assumed for the telephone circuit itself, it may be necessary at times to compensate for the distortion of the lines joining the phototelegraph centre to the trunk centre.
- d) The equivalent should remain as constant as possible during transmission of pictures. The effect of abrupt variations of even 0.1 neper or 1 decibel has an influence upon the pictures transmitted. It is, moreover, necessary to avoid any interruption of the circuit, however rapid. That is why the greatest attention should be paid to the measurements made on the repeaters and the lines and to the changing of batteries. To avoid all disturbance it is desirable for the main trunk centres to be excluded from the circuit when it is extended to the phototelegraph exchanges.

Special precautions should be taken to make sure that no modulation of the carrier-current is caused either by the line or by the amplifiers, even if this modulation is inaudible. Such modulation may be caused in particular either by variations in voltages of the supplying batteries or by infra-acoustic telegraph installations.

- e) The output level (of transmission) of the repeaters should be between + 0.5 neper or + 4.5 decibels and + 1.0 neper or 9 decibels. The power of the phototelegraph transmitter should be calculated in such a way that the power during the transmission of a dash is from 10 to 20 mW at the output of these repeaters.

3. The differing propagation times of the various frequencies and the final width of the transmission interval give rise to transient phenomena (at build-up and decay) which limit the speed of picture transmission. A narrower transmission interval should be used — and consequently a lower transmission speed — in proportion as the differences between the propagation times in the transmission intervals are greater. The quality of the pictures transmitted depends on the scanning density and the duration of the transient phenomena which vary according to the transmission qualities of the lines. The principal results of a great number of experiments carried out with a density of 5 lines per mm are given as an illustration in the following paragraph.

Lines with medium heavy loading were used for a transmission lasting 6 minutes per dm^2 up to 600 km, and in a transmission lasting 3 minutes per dm^2 up to 300 km. In the case of longer cables, phase distortion should be eliminated by means of phase compensators. Long distance circuits with phase compensation and medium heavy loading have already been successfully used for phototelegraph transmission for distances up to 1800 km, with a transmission duration of 3 minutes per dm^2 . Phototelegraph transmission may also be made with no phase compensation, on cable circuits with light loading for distances up to 1800 km, with a transmission duration of 3 minutes per dm^2 and 3600 km with 6 minutes per dm^2 .

4. Interference by crosstalk, noises due to strong currents and reaction coupling currents, should be small enough for the difference between the level of disturbing currents and the level of phototelegraph currents to be at least 2 nepers or 17.0 decibels. If echo suppressors are employed in four-line circuits, a stability of 0.5 neper or 4.5 decibels is sufficient.

5. It is desirable that the circuits used for picture transmissions be marked with a characteristic sign in the terminal centres and in the intermediate repeater stations; in addition, special instructions should be given to personnel so that they do not interfere while a picture transmission is taking place.

**Recommendation No. 587. Synchronisation of phototelegraph apparatus
working on carrier-current circuits or on coaxial cables**

The C. C. I. T.,

considering

that the C. C. I. F. has recommended that a frequency transmitted by a telephone channel of a carrier system by non-loaded cable or coaxial cable should not be changed by more than ± 2 cycles per second;

that the maintenance of synchronism between two sending and receiving phototelegraph stations requires greater precision according to the directives of the C. C. I. T.;

that methods allowing of the solution of the above difficulties should be recommended forthwith to the Administrations and private operating agencies concerned,

unanimously declares the view

that the preferred method of overcoming this difficulty of synchronization on certain apparatus at present in use is the following. For transmission, the frequency (1020 c/s) used for the adjustment of the synchronization modulates the carrier frequency used for picture transmission (1300 c/s). This modulated carrier frequency is sent to line before the transmission of the picture itself during the time necessary for the adjustment at the receiving end. The synchronization frequency (1200 c/s), restored by detection, can then be used in the normal manner for the purpose of synchronization.

**Provisional Recommendation No. IV/4 (588). Utilisation of carrier telephone circuit
for the transmission of phototelegrams**

The C. C. I. T.,

considering

1. that carrier telephone circuits have a bandwidth which has been standardised as ranging from 300 to 3400 cycles per second, and that the C. C. I. F. has issued recommendations concerning such circuits;

2. that from statistics at present available it is not clear to what extent this bandwidth is utilisable for the transmission of phototelegrams without distortion;

3. that nevertheless it is clear that such circuits do provide a much wider usable bandwidth than that to which the existing recommendations apply,

recommends

1. that the C. C. I. F. be asked whether it is possible to extent the present information concerning such carrier telephone circuits, particularly in respect of group delay characteristics;

2. that provisionally, where such carrier telephone circuits are utilised for the transmission of phototelegrams, it is allowable to use speeds of transmission of 90 or 120 revolutions per minute with index of co-operation of 352, or alternatively an index of co-operation of 528 with a speed of transmission of 60 revolutions per minute;

3. that when such higher speed or index of co-operation is used, the carrier frequency should be sufficiently high to allow of good transmission, and provisionally a frequency of 1900 cycles per second is recommended;

4. the study of the utilisation of modern carrier telephone circuits for the transmission of phototelegrams should be continued.

Comment : See Question V-8 b allocated to Study Group No. IV.

Provisional Recommendation No. II/19 (602). Conditions to be fulfilled by regenerative repeaters employed for 7 unit start-stop transmission

The Study Group II of the C. C. I. T.,

in view of Recommendation SG. II/13 (389) regarding the siting of regenerative repeaters in international telex circuits,

in view of Recommendation No. III/1 (652) on the transmission cycle of start-stop apparatus,
considering

that as there are at present large numbers of start-stop instruments having a 7 unit transmission cycle, it is necessary to define the conditions to be satisfied by 7 unit regenerative repeaters;

that, since it is unlikely that the growth of the international Telex network will demand the use of regenerative repeaters on transit international trunk circuits for some years, the regeneration of 7 unit signals need only concern those Administrations having start-stop instruments which transmit 7 unit signals

declares the view

that the duration of the stop element should never be less than 16 milliseconds, and consequently the mean speed must be

a) either the theoretical speed, with a tolerance of $\pm 0,1 \%$, in which case it is necessary to employ a device to control the duration of the stop signal;

b) or the mean speed of the transmitter, with a suitable tolerance, in which case such a device is unnecessary;

that the degree of gross start-stop distortion of the retransmitted signals, including the stop signal, should be less than 10 %;

that the isochronous margin should not be less than 40 %;

that it seems desirable to permit dialling impulses to bypass the regenerative repeater when the transmission of these impulses has to be envisaged but that the study of this question should, however, continue;

that the arrangements to be adopted for the present for the transmission of dialling impulses should be bilaterally agreed between the Administrations concerned;

that the regenerative repeaters should be capable of retransmitting the various supervisory signals employed in switching systems (except that when arrangements are made for the dialling impulses to bypass the regenerative repeater it could equally be unnecessary for certain of the supervisory signals to be transmitted by the regenerative repeater).

Recommendation No. 612. Characteristics of relays

The C. C. I. T.,

considering

that it is useful to define more clearly the characteristics of the function and use of telegraph relays;

that in choosing definitions, it is more important to determine quantities which can be measured by simple methods and ordinary equipment rather than theoretic quantities not easily measured which would be applicable only in improvement research;

that the alternative of such a choice is to limit the general range of application of the definitions;

unanimously declares the view

that, in the case of electro-magnetic relays which have a single control, circuit the principle characteristics of the function and use may be defined in the following way :

Degree of distortion of a relay.

The degree of distortion of a relay for a determined telegraphic speed may be defined as the degree of distortion of the signals re-established by the relay when it is controlled by a periodic alternating current whose frequency, expressed in units per second, will have a value equal to half of the anticipated telegraphic speed, expressed in bauds.

Degree of bias distortion of a relay.

When a relay is supplied by an alternating current, and during a period T the armature rests against one of the stops for a time t_1 , and against the other for a time t_2 , the degree of bias distortion of the relay is the ratio $(t_1 - t_2)/T$.

This quantity may be measured by means of the auxiliary installation for the neutral adjustment of relays, described in Recommendation No. 618.

Sensitivity.

When the relay is supplied by a sinusoidal current with a frequency of 25 c/s, the definite functioning of the relay, i. e. the passage of its index from one stop to another, takes place only when the maximum intensity of the control current (or again, the maximum excitation value expressed in ampere-turns) is greater than a certain value characteristic of the sensitivity of the relay.

Necessary control current or necessary excitation.

When it is desirable to find out more precisely in what conditions a relay may be employed in service, the idea of sensitivity is replaced by that of necessary control current or necessary excitation.

These terms are applied to the lower limits which the maximum intensity of the control current or the maximum excitation of the relay cannot reach without producing the following effect, provided that the relay has been completely neutralized and supplied with sinusoidal current of 25 c/s:

1. The distortion proper of a relay surpasses 0.05 (5 %).
2. The passage time of the armature, measured for example by means of the installation described in Recommendation No. 618, surpasses 5 ms.

Constancy.

An indication of the constancy of a relay is given by the functioning time of the apparatus, supplied by a current whose intensity is twice that of the necessary current, at the end of which the bias distortion of the relay has reached 5 %.

Magnetic stability.

If the bias distortion of a relay, which has been completely neutralized and subjected to considerable continuous excitation for three seconds, is measured when the excitation value is twice that of the necessary excitation, the ratio of the greatest value that the previous continuous excitation may have, without causing a bias distortion of more than 0.05 (5 %) to the value of the necessary excitation, is considered as being characteristic of the magnetic stability.

Mechanical stability.

The greatest distance to which one can shift a contact stop of the relay, which has been completely neutralized beforehand without causing a bias distortion of more than 0.05 (5 %), when

the relay receives, for measuring purposes, an excitation whose value is twice that of the necessary excitation, is considered as being characteristic of the mechanical stability.

For a more thorough examination of the relays, it is useful to collect similar measurements, employing different excitation values.

Distortion of a relay supplied by non-sinusoidal currents.

In a thorough study of types of relays, it is useful to measure the distortion of signals re-established by the relay when the currents controlling it are non-sinusoidal.

In particular, a transmitter for measuring distortion and conforming to the C. C. I. T. recommendations can be used for these additional tests and the relay can be supplied in such a way that the wave-shape of the testing currents offers some similarity to that of the currents the relay may receive in service.

Electrical characteristics of relays.

For practical requirements a relay may be sufficiently characterized with regard to its electrical properties by :

- a) the value of its ohmic resistance;
- b) the value of its effective resistance and its effective reactance, for an alternating sinusoidal current of 25 c/s with its intensity expressed as a function of the necessary control intensity;
- c) the number of turns of its windings.

Recommendation No. 613. Limitation of the period of relay bounce

The C. C. I. T.,

considering

that too long a period of armature bounce is a serious cause of distortion;

that it seems possible to lessen the amount of bounce in modern relays by appropriate construction of the armature,

unanimously declares the view

that it is desirable that the period of bounce of relays employed in the international service should not exceed

1 ms for relays employed in transmission,

2 ms for relays employed in reception,

these relays being controlled by an alternating sinusoidal current of 25 c/s with an intensity equal to twice that of the necessary control current.

Recommendation No. 614. Determination of relay characteristics

The C. C. I. T.,

considering

that the definition of the values of the principal characteristics mentioned in Recommendation No. 612 depends on knowledge of the distortion of signals by these relays when they are adjusted and supplied in specific conditions,

unanimously declares the view

that a determination of the various characteristics of relays may be made in the following conditions :

The values of relay characteristics are determined from the curve showing the variations in the degree of distortion of the relay in terms of the intensity of the control current, the intensity of the previous continuous excitation current or the shifting of the contact stops around the neutral position.

The degree of bias distortion of signals re-established by a relay, for a given telegraphic speed, may be measured by means of a device set up according to the following principles :

The control current of the relay is, as the case may be, produced by an alternating current generator, or obtained by modulating the continuous current by means of an oscillating device, so that the characteristic instants of modulation, whether they are separated by equal or unequal intervals of time, are all produced at the same phase of the cycle of this device.

The stops of the relay under examination are attached to an appropriate electric circuit, and the coming into contact of the relay armature with its stops instantly provokes an optical phenomenon (light flash, deviation of the spot of a cathode oscillograph, deviation of the light ray of an oscillograph ...).

By employing a suitable mechanical or electrical system, synchronous with the generating or modulating device of the relay control current, the optical phenomenon provoked by the function of the relay is shown on a screen in a position which indicates exactly at what phase of the cycle of the generating device the relay has functioned.

Thus, if the re-establishment of the signals were perfect, the positions corresponding to the successive contacts of the armature with a specified stop would be merged. The observation of the zone in which these positions are dispersed allows the degree of distortion of the re-established signals to be determined.

To ensure sufficient accuracy in determining relay characteristics, the device used should allow a reading to the hundredth part of the cycle's duration.

Recommendation No. 615. Unbalance of differential relays

The C. C. I. T.,

considering

that the differential relays used for the duplex service, or connected in such a way that their windings are traversed by homopolar currents, should satisfy special requirements concerning their electric and magnetic balance,

unanimously declares the view

that, in order to ensure that these relays are constructed or adjusted in a satisfactory manner, they may be subjected to tests, the principle of which is described below :

1. Balancing for the duplex service

1st method. The circuit of diagram I is set up.

L represents the winding (or the group of windings) of the relay connected on the line side;

E represents the winding (or the group of windings) connected on the balancing network side;

R_L and R_E are adjustable resistances;

S_1 is a source of sinusoidal current, of frequency equal to 25 p/s and of negligible internal reactance.

S_2 is a source of disturbing current (for example, a transmitter producing regular alternations of a rectangular form, corresponding to a telegraph speed a little different from 2×25 bauds).

The resistances R_L and R_E are chosen in such a manner that, on the one hand, the time constants of the circuits traversed by the currents generated by the disturbing transmitter are of the order of 5 ms and that, on the other hand, there is equality between the total resistances of the circuits on either side of the branch containing the disturbing generator.

This being so, the disturbing generator is excluded from the circuit. The output of the generator S_1 is assessed in such a manner that the value of the current traversing the windings of the relay is half of that which flows through the winding L under normal service conditions, and the relay is adjusted in a perfectly symmetrical manner.

Then the distortion of the relay is measured.

Then the disturbing generator is connected in the circuit; its voltage is selected so that the intensity of the current circulatory in the windings of the relay is at least equal to that used under normal service conditions, and preferably quite large. The distortion is then measured under these new conditions.

The increase in the degree of distortion observed gives an indication of the competence of the relay in the duplex service.

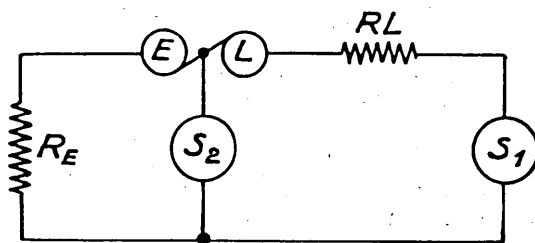


Fig. 1

2nd method. The circuit of diagram II is set up.

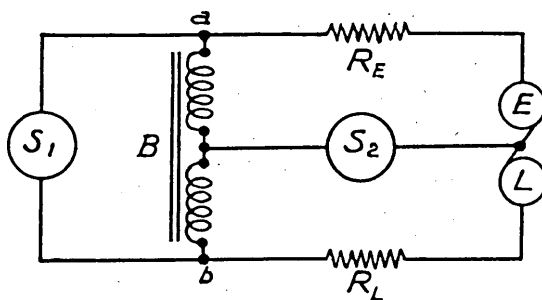


Fig. 2

In this diagram E , L , R_E , R_L , S_1 and S_2 represent the same elements as in diagram I.

B is an inductance coil of two perfectly symmetrical windings, connected in such a way that its impedance, measured between points a and b is high, and that, on the contrary, the impedance it presents to the circuits traversed by the current generated by the disturbing transmitter is negligible.

The adjustments and the tests are carried out under the same conditions as in the first method.

With this second method, a greater sensitivity is obtained than with the first.

2. Balancing for homopolar currents

This balancing may be used in the case of a relay with four windings likely to be connected in service in accordance with diagram III.

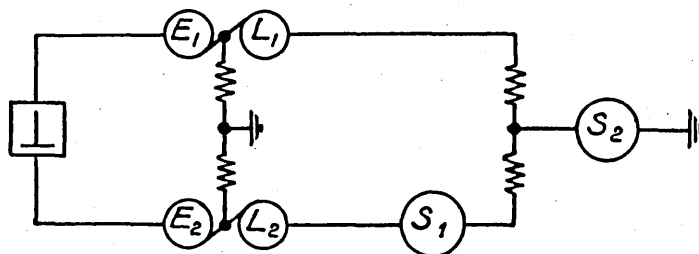


Fig. 3

The windings connected on the balancing network side are E_1 and E_2 . Those connected on the line side are L_1 and L_2 .

The testing of the balance may be carried out by the same methods as for relays serving in duplex, with the slight difference that, in the test connections, the winding (or the group of windings) E is replaced by the group of windings E_1 and L_2 , connected in series, and the winding (or group of windings) L by the combination of windings E_1 and L_2 connected in series (diagram IV).

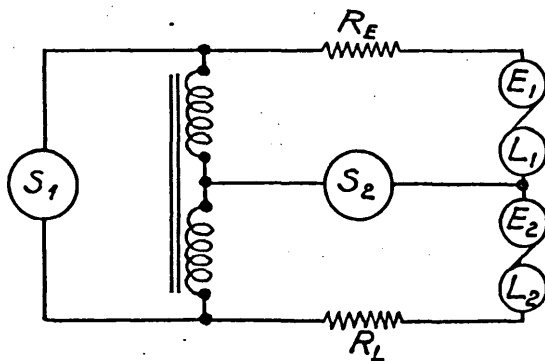


Fig. 4

Recommendation No. 618. Adjustment of relays

The C. C. I. T.,

considering

that, on long aerial lines, the electrical characteristics of which vary constantly and considerably, the adjustment of the relay, performed on the installation which it serves when it is supplied by the line currents, sometimes makes it possible to compensate for the line irregularities and to ensure permanence of operation;

that, on the other hand, on stable lines the adjustment of the relay may be performed almost entirely on a special auxiliary installation, which reduces to a minimum the immobilization of the lines and the intervention of service correspondence;

that a certain number of relays are constructed in such a way as to permit three types of adjustment : the adjustment of the magnetic current, the setting of the travel of the armature (separation of the stops) and, lastly, the displacement of the armature from neutral position with respect to the stops;

that the effect of a change in the first factors is very important and can be determined only after a study necessitating measurements made with apparatus unavailable to the personnel responsible for ordinary operation;

therefore, the security of service requires that the corresponding adjustment must not be subject to the control of these personnel;

that, on the other hand, the third adjustment is often useful and may easily be checked,

unanimously declares the view

1. that there is no reason to recommend any special methods for the adjustment of the relay equipment of long aerial lines;

2. that, as far as the relay equipment of stable circuits is concerned, particularly those using long-distance cable circuits :

only adjustment which allows modification of the unbalance of the functioning of the relay may be performed when the relay is in service ;

the adjustment tolerances of the magnetic circuit and the setting of the armature travel, or, for certain types of relay, the methods to be employed for making the proper adjustment and setting, should be fixed in permanent specifications;

that the adjustments be performed as far as possible on auxiliary installations, such as those cited below as an example, which make it possible to determine whether the relay has the necessary sensitivity, is perfectly neutralized, or, on the other hand, is functioning in the desired direction at a suitable level, that is, is working with sufficient regularity.

Example of an auxiliary installation for the neutral adjustment of relays (fig. 1).

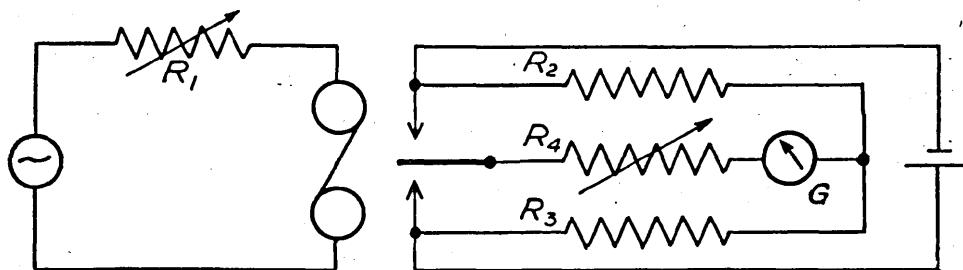


Fig. 1

The relay is supplied through a rheostat R_1 by an alternating current generator of 25 cycles per second.

The contact stops of the armature are converted at the same time to the terminals of a source of direct current and are bridged by equal resistors R_2 and R_3 in series. The armature is connected to the common point of R_2 and R_3 through a sensitive zero-centre galvanometer G , capable of integrating the current that flows through it, and an additional rheostat R_4 .

When the armature rests against one stop, the galvanometer is traversed by a current of definite direction and magnitude. When the armature rests against the opposite stop, the current passing through the galvanometer is reversed but of the same magnitude as before. Finally, when the armature is not against either of the stops, no current flows through the galvanometer.

When the armature rests against one of its stops 1, the rheostat R_4 may be adjusted for the galvanometer to indicate 100 divisions.

If the relay is then excited by a periodic current, the needle of the galvanometer indicates a value n proportional to the average current flowing through the galvanometer. If t_1 represents the time that the armature rests against stop 1, and t_2 the time against the opposite stop 2, in the course of a cycle T ,

$$\frac{n}{100} = \frac{t_1 - t_2}{T}$$

In particular, $t_1 = t_2$ corresponds to neutral adjustment of the relay when the galvanometer needle remains at zero.

Example of an auxiliary installation for determining the time of armature travel (fig. 2).

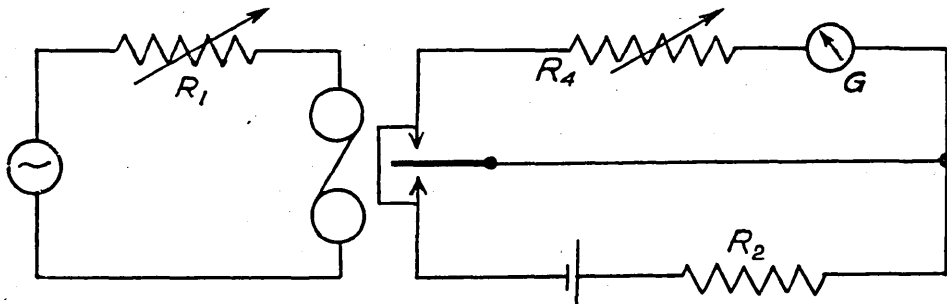


Fig. 2

The relay is supplied through a rheostat R_1 by an alternating current generator of 25 cycles per second.

The two contact stops of the armature are short-circuited by an external link. The armature is connected to the stops, on one side through a source of direct current and a resistance R_2 limiting the output of this source in case of short circuit, and on the other side through a sensitive galvanometer G and an additional rheostat R_4 .

When the armature remains against one stop or the other, the branch containing the galvanometer is short-circuited, and no current passes through the galvanometer. On the other hand, when the armature does not touch either of the stops, the galvanometer is traversed by a current whose intensity may be adjusted by the setting of rheostat R_4 .

While the armature is kept in this intermediate setting, R_4 may be set so that the galvanometer reads 100 divisions.

If the relay is then excited by means of a periodic current, the needle of the galvanometer will indicate m divisions.

The ratio $\frac{m}{100}$ then represents the fraction of the period during which the armature does not touch either contact, that is to say, if the phenomenon of bounce is negligible, the ratio of the time necessary for the travel of the armature from one stop to the other as compared with the duration of the period.

Recommendation No. 621. Emission distortion for start-stop apparatus

The C. C. I. T.,

considering

that it is advisable to specify the operational conditions to be required for start-stop apparatus in the international service concerning emission distortion,

unanimously declares the view

that the difference between the modulation speed of the apparatus and the standardized speed of 50 bauds should not exceed $\pm 0.75\%$;

that the difference between the characteristic instants of modulation of an apparatus and the corresponding instants of modulation of a perfect apparatus giving the starting signal at the same moment and having the same average speed should not exceed ± 1 millisecond;

that, instead of making sure that neither of the two limits mentioned above is exceeded, one need only make sure that the emission distortion of the signals modulated by the apparatus does not exceed 10 %, it being assumed, of course, that the perfect modulation with which the actual modulation is compared would be that of an apparatus whose modulation speed would be exactly equal to 50 bauds.

(See Question Geneva No. 15 allocated to Study Group No. III.)

Recommendation No. 631. Standardization of multiplex apparatus

The C. C. I. T.,

considering

that it is advisable to standardize certain data relating to international multiplex apparatus;
that synchronization by special signals is the most simple,

unanimously declares the view

1. that the types of plates be standardized as follows :
12 contact plates for installations working on double duplex;
17 contact plates for installations working on triple duplex;
25 contact plates for installations working on quadruple simplex or duplex;
2. that the speed be fixed at 180 r. p. m., but that a speed of 210 r. p. m. may nevertheless be used for manual or joint transmission apparatus;
3. that synchronization be achieved with the help of special signals;
4. that code No. 1 be applied in all multiplex installations.

**** Recommendation No. 641. Standardization of telegraph codes for printing apparatus**

(See *Telegraph Regulations-Paris Revision-art. 34*)

Recommendation No. 646. Extension of the facilities provided by Alphabet No. 2

The C. C. I. T.,

considering

that, in order to examine the means of extending the facilities provided by the International Alphabet No. 2, a study has been undertaken;

that it is possible that this study will lead to the conclusion that a third inversion should be produced by signal No. 32 ;

that, under these circumstances, it would be desirable that the Administrations should not provide for the utilization of signal No. 32 before the end of this study;

but that certain Administrations are already utilizing, or intending to make certain utilizations of, signal 32, either as an actual signal on teleprinters, or as a signal for switching operations,

unanimously declares the view

that, during the course of the study of the means of extending the facilities provided by Alphabet No. 2, Administrations having the intention to use signal 32 should not do so before having communicated their plans to the Commission entrusted with this study.

Remarks

a) with regard to this question the Chairman of the Committee of the Subscribers' Service mentioned that the clearing signal in this service will be a signal lasting 0.3 seconds, which on certain apparatus might have the same effect as the reception of signal 32;

b) the French Delegation pointed out that they contemplated the use of the signal 32, repeated twice, as a separation signal between telegrams in switched networks, and that they need a combination for the maintenance of synchronization on submarine cables;

c) the United States Delegation stated that at the present time they use the combination 32 for various purposes, and that they are studying new utilizations of the same.

(See Question Geneva 17 allocated to Study Groups IX and XI.)

Recommendation No. 651. Standardization of start-stop apparatus in general

The C. C. I. T.,

considering

it desirable that certain data relating to the start-stop apparatus of the international service be uniformly established;

that it is not indispensable, for co-operation, that the stop signals should be of equal length,

unanimously declares the view

1. that start-stop receivers should be able to operate with 7 signals of equal length;
2. that, in certain special cases, it is advisable to use a long stop emission, and that, in this case, a stop emission of a duration of one and a half units may be used;
3. that the speed should be exactly 50 bauds;
4. that the number of characters which the textual line of the page-printing apparatus may contain should be fixed at 69.

(See Question Geneva 15 allocated to Study Group No. III.)

Provisional Recommendation No. III/1 (652). Transmitting cycle of start-stop apparatus

The C. C. I. T.,

considering

that at present there is a need for teleprinters having 7 unit transmitters to be able to work with teleprinters having 7 ½ unit transmitters;

that the regeneration of 7 unit signals being a difficult problem, on account of the need to avoid excessive shortening of the stop signal and the need for very close tolerance ($\pm 0.1\%$) in the speed control of the repeater, it is clear that the technical design and maintenance of regenerative repeaters would be much easier if the signals to be regenerated were greater than 7 units (i. e. the stop signal greater than 1 unit in duration);

that without further study it is not possible to determine what is the minimum increase in duration of the stop signal which would need to be made to overcome the difficulties of regeneration, but that it can be said that the use of a stop signal having a duration of 1.4 or 1.5 units would greatly facilitate the design and maintenance of the repeater and completely resolve the transmission problems of regeneration of teleprinter signals;

that a considerable development of the telex service may be expected in the future,

declare the view

that it is desirable to abandon a 7 unit transmitting cycle in future;

that a *joint working party of Study Groups No. II and III* should be set up to study the minimum increase of the duration of the stop signal which is necessary for correct transmission and the other requirements which must be satisfied by regenerative repeaters, and, in consequence revise Recommendation No. 651;

that in view of the importance and urgency of the question, the joint working party should complete their study within twelve months.

Recommendation No. 653. Secondaries of letters F, G, H of start-stop apparatus

The C. C. I. T.,

considering

a) that some Administrations exercise, whereas others do not, the right granted by the Telegraph Regulations to assign the secondaries of letters F, G and H to internal use;

b) that it is desirable to avoid disadvantages which might result from exercising this right in international services,

unanimously declares the view

1. that the use of secondaries of F, G and H should be prohibited in international services, except by direct agreement between Administrations;

2. that, in all services, the secondaries of F, G and H should be shown in some special manner on the keyboard;

3. that services in which these secondaries are not used should place on the secondary position on the printing blocks of the letters F, G and H an arbitrary sign, such, for instance, as a square, the appearance of such sign on the paper to indicate an abnormal impression.

Recommendation No. 654. Confirmatory symbols in connection with the „ Who are you ” and „ warning bell ” signals in start-stop apparatus

The C. C. I. T.,

considering


that some Administrations desire that a confirmatory symbol be printed by start-stop apparatus whenever the “ Who are you ” or warning bell signals have been transmitted or received;


that, while the choice of symbols to be printed for this purpose appears to be a question concerning national services only, it is in the interest of the manufacturers of such apparatus that the Administrations concerned should agree to the adoption of the same graphical symbols;

that, in view of the fact that on certain apparatus the reception of the signal "secondary of J" (bell signal), causes no movement of the paper, certain precautions must be taken to permit the co-operation of apparatus printing a confirmatory symbol and apparatus which prints no confirmatory symbol,

unanimously declares the view

that such Administrations as are desirous of confirming the reception or the transmission of signals "secondary of D" ("Who are you" signal) or "secondary of J" shall effect this confirmation by printing :

the symbol  for the confirmation of the signal "secondary of J"

the symbol  for the confirmation of the signal "secondary of D"

that for control of the warning bell, several signals "secondary of J" one signal "carriage return" one signal "line feed" and one signal "carriage return" should be transmitted in the order indicated.

Recommendation No. 655. Confirmatory symbols for "carriage return" and "line feed" on tape-printing start-stop apparatus

The C. C. I. T.,


considering


that some Administrations desire that a confirmatory symbol be printed by tape-printing start-stop apparatus whenever they send or receive the signals "carriage return" or "line feed";

that, while the choice of the symbols to be printed for this purpose appears to be a question concerning national services only, it is in the interest of the manufacturers of such apparatus that the Administrations should agree to the adoption of the same graphical symbols,

unanimously declares the view

that such Administrations as are desirous of confirming on a tape machine the reception or transmission of the signals "carriage return" and "line feed" shall effect this confirmation by printing :

the symbol  for the signal "carriage return"

the symbol  for the signal "line feed".

Recommendation No. 656. Precautions to be taken with start-stop apparatus fitted with automatic time delay switches

The C. C. I. T.,

considering

that time-delay devices may be used on start-stop communications, even when these communications are effected on switched networks;

that unification of the delay-time of these automatic devices might give rise to serious technical complications;

that precautions should be taken lest an operator, the motor of whose apparatus is rotating, should transmit signals to an apparatus of which the motor has just stopped,

unanimously declares the view

1. that there is no reason to unify the lapse of time between the reception of the last signal and the automatic disconnection of the motor by the time-delay device.

2. that it is, however, desirable that this disconnection should not take place before the lapse of at least 45 seconds after the reception of the last signal;

3. that, in the case of a pause in transmission for a period equal to or longer than 30 seconds, operators or subscribers are recommended to send the signal No. 29 of Alphabet No. 2 ("letter-shift") and to wait at least 2 seconds after the emission of this signal before recommencing transmission.

Provisional Recommendation No. VII/1 (657). Start-stop apparatus motor control arrangements on private point-to-point circuits

The C. C. I. T.,

considering

1. that in the case of private point-to-point circuits it is desirable that the teleprinter motors shall be started with the commencement of traffic signalling, and stopped with the cessation of such signalling;

2. that the general practice on such circuits is to utilise a time-delay device associated with the teleprinter which allows of such operation — see also Recommendation No. 656;

3. that for reasons associated with the unification of terminal apparatus and for others, certain Administrations have expressed a preference for the utilisation of a method whereby calling and clearing signals be used, as in the Telex service, to effect the starting and stopping of the teleprinter motors,

declares the view

a) that in the case of private point-to-point circuits the terminal apparatus shall be so equipped as to allow of the starting and stopping of the teleprinter motors with the commencement and completion respectively of the traffic;

b) that these facilities shall normally be provided by means of the time-delay device incorporated in the teleprinter, whereby the teleprinter motor is started immediately upon commencement of the signalling of traffic, and is stopped within a time not less than 45 seconds after the last signal of traffic;

c) notwithstanding b) above, Administrations can, if they so find it convenient, arrange between themselves to use an alternative method whereby the teleprinter motor is started by the use of a call signal, and stopped by the use of a clearing signal. In such cases the calling and clearing signals employed should conform to those standardized for the Telex service, viz. Recommendation No. 861, Art. 23.

Note: The application of the above principles to public point-to-point circuits involve deeper consideration of operational methods, and Study Group IX should consider whether it is desirable to adopt such principles for public point-to-point circuits. (See Question VI-5b allocated to S. G. No. 1 X.)

Recommendation No. 661. Standardization of the start-stop apparatus of the subscribers' telegraph service

The C. C. I. T.,

considering

that the start-stop apparatus is capable of receiving communications without the help of an operator; that this advantage may be useful to the subscribers to the international telegraph service operated by start-stop apparatus;

that it is therefore desirable that a caller subscriber should be able to check the identity of his correspondent, if there is no reply,

unanimously declares the view

that it is advisable

1. to supply a code transmitter to all the subscribers' posts taking part in the international service of start-stop telegraphy subscribers;

2. to effect the disconnection of the code transmitter by the combination of number 4 (letter D) in the alphabet (Madrid Regulations), preceded by the signal "figures";
3. to compose the code-emission by a series of 20 signals, as follows :
 - 1 signal "letters",
 - 1 carriage return,
 - 1 line feed,
 - 1 signal "letters" or, if necessary, "figures",
 - 15 signals chosen by each Administration for the code signal of the subscriber,
 - 1 signal "letters";
4. when the code signal does not comprise 15 characters, to distribute them by inserting as many "letters" signals as are necessary to make up the total of 15 signals; this would give the caller subscriber the chance of noting clearly the end of the requested code transmission.

*** Recommendation No. 671. Standardization
of paper for page-printing start-stop apparatus**

(New text in conformity with Provisional Recommendation III/2.)

The C. C. I. T.,

considering

that standardization of paper width would necessitate major modifications to the apparatus currently in use;

that standardization of the dimensions of rollers and feed-in devices for folded or perforated paper does not seem to be a matter of international importance;

that, for the time being, the experience acquired of reception on forms is not such as to allow standards to be evolved,

recommends

that format should not be standardized;

that, nevertheless, the question of how many lines there should be in the form and in the heading should continue to be studied, for both rolled and folded paper.

*** Recommendation No. 681. Standardization of phototelegraph apparatus**

(New text in conformity with Provisional Recommendations No. IV/1 and IV/5)

The C. C. I. T.,

considering

that the transmission of pictures is possible only if certain characteristics of the transmitting and receiving equipments are identical,

declares the view

that photograph apparatus should be constructed and employed according to the following standards :

Scanning helix.

At the transmitting post, scanning is performed over a „right hand” helix. Consequently it takes place at the receiving post over a “right hand” or a “left hand” helix according to whether reception is “positive” or “negative”.

Index of the scanning helix.

The index, defined by the formula

$$M = \frac{D}{P} = DF$$

where D is the diameter of the helix,

where P is the line advance of the helix,

where F is the scanning density (or lines per unit length).

The normal index is 352.

The preferred alternative index, for use when less dense scanning is required, or when the characteristics of circuits, and particularly combined line and radio circuits so demand, is 264.

The preferred alternative where the characteristics of line circuits allow of more dense scanning is 528.

The following table gives corresponding values of M, D, P and F.

M	D	P	F
264	66 mm	1/4 mm	4 lines per mm
264	88 mm	1/3 mm	3 lines per mm
352	66 mm	3/16 mm	5 1/3 lines per mm
352	88 mm	1/4 mm	4 lines per mm
528	66 mm	1/8 mm	8 lines per mm
528	88 mm	1/6 mm	6 lines per mm

Dimensions of drum and picture.

The normal drum diameter is 66 mm.

The preferred alternative drum diameter is 88 mm.

The length of the drum may not be less than twice its diameter, i. e. 132 mm for the normal drum, and 176 mm for the alternative drum.

In the case of the normal drum the width of the two picture-retaining clips together may not exceed 15 mm. An allowance of 5 mm is also made for phasing. Thus since the total circumference of the drum is about 207 mm, the usable circumference will be 187 mm.

The normal dimensions of the pictures are 13 cm × 18 cm.

Scanning speed.

The following are the normal and approved alternative combinations of drum rotation speed and index :

	Drum Rotation Speed	Index of Co-operation	
		Line Circuits	Combined Line and Radio Circuits
Normal conditions	60 rpm. 90 rpm.	352 —	352 264
Alternatives for use where line circuits are suitable	60 rpm. 90 rpm. 120 rpm.	264 and 528 264 and 352 264 and 352	— — —

The rotation speed must be adjustable, and the margin of adjustment should be at least 5 hundred-thousandths above and 5 hundred-thousandths below normal.

After regulation the speeds of the transmitting and receiving sets should not differ by more than one hundred-thousandth.

The stability of the rotation speed should be such that the maximum shift of the drum surface from the average position should not exceed one quarter of the scanning helix line advance, which, at normal index 352, means that the maximum angle of the oscillations should not exceed 0.08 degree measured from the average position.

Frequency of carrier-currents.

For audio-frequency telephone circuits the frequency of the picture carrier-current is fixed at about 1300 c/s. This frequency gives the least phase distortion on lightly loaded underground cables for a frequency bandwidth of 2×550 c/s, corresponding to a drum rotation speed of 60 r. p. m. and index of co-operation 352.

In the case of carrier telephone circuits providing a transmission band from 300 to 3400 c/s, a carrier-current frequency of about 1900 c/s is recommended.

Equalization of speeds.

To compare the speeds of a transmitter and receiver, an alternating current whose frequency bears an unvarying relationship to the transmitter drum speed, and has a nominal value of 1020 c/s, is used. This current is received in some form of stroboscopic at the receiver.

The speed of the receiver is adjusted to within one hundred-thousandth of the speed of the transmitter; the required condition is indicated when the phase difference of the stroboscopic display does not exceed one white sector plus one black sector (or their equivalent) in either two minutes or one minute according to whether the flashing frequency is equal to or double the comparison frequency.

Where there is the possibility that the transmitter and receiver may be connected by a carrier telephone circuit, additional apparatus is necessary to provide in such case for the transmission and reception of a modulated carrier-frequency (instead of a simple 1020 c/s frequency) in conformity with Recommendation No. 587.

Phasing.

To ensure synchronization between continuously rotating drums and self-starting drums, it is necessary:

that a continuously rotating transmitter sends a phase "signal" at the moment when the retaining clips on the drum let the light ray pass;

that, in a self-starting transmitter, the drum locks with the control mechanism in only one position;

that a continuously rotating receiver registers a phase signal at the moment when the retaining clips of the drum let the light ray pass;

that, in a self-starting receiver, the arrangement should be such that the drum is blocked in the rest position with its retaining clips exactly opposite the luminous scanning point until the starting signal is received.

The duration of the phase signal should be sufficiently long to allow the receiver to be put exactly into phase with the transmitter without producing an axial movement.

Signals for phasing and starting must be performed with an alternating current easily received and suitable for transmission on the circuit. Their duration should not exceed the time taken by the passage of the retaining clips across the luminous scanning point at the transmitter. Both the synchronising current of 1020 c/s and the carrier-current may be used for this purpose.

Provisional Recommendation No. IV/6 (682). Phototelegraphy Service in the extra-European system

The C. C. I. T.,

considering

1. that the International Telegraph and Telephone Conference of Paris, 1949, was of the opinion
 - a) that the phototelegraphy service in the extra-European system is steadily developing, and
 - b) that the existing provisions relative to the European service are not wholly adapted to the extra-European system,

has resolved that the C. C. I. T. should study this question, with a view to issuing a recommendation on provisions which might be applied by all Members and Associated Members of the Union;

2. that it has accepted the Recommendation No. 25 of the C. C. I. R. meeting at Stockholm, 1948, regarding the method of transmission to be used when sending phototelegrams over radio circuits, and also the drum speeds and corresponding indices of co-operation therein laid down, and that it has incorporated these recommendations of the C. C. I. R. in the Provisional Recommendation No. IV/1 (582) of the C. C. I. T.;

3. that it has amended Recommendation No. 681 of the C. C. I. T. to conform to the Provisional Recommendation No. IV/1 (582) of the C. C. I. T.;

4. that the matter of whether variation is desirable in the present standards regarding sizes of drums is still to be studied by a combined committee of the C. C. I. T. and C. C. I. R.,

declares the view

that in so far as Resolution No. 15 of the Paris Conference relates to the standards of transmission in the extra-European system, it has been resolved by the amendments carried to C. C. I. T. Recommendation No. 681 and the acceptance of the C. C. I. R. Stockholm Recommendation No. 25 which has been incorporated in C. C. I. T. Provisional Recommendation No. IV/1 (582).

Provisional Recommendation No. II/11 (711). Causes of disturbances to signals in V. F. telegraph channels and their effect on telegraph signal distortion

The C. C. I. T.,

considering

that the great majority of international telegraph circuits are routed on V. F. telegraph channels; that V. T. telegraph channels are liable to disturbance from the following causes:

1. Variations in the voltage and frequency of the source of telegraph carrier frequency due to variations in the power supply, and variations in the signalling load in the case where the carrier source supplies several channels.

2. Abrupt or gradual changes in the transmission equivalent of the telephone circuit.

3. Intelligible crosstalk from other telephone circuits, particularly near end crosstalk.

4. Unintelligible crosstalk resulting from the cross-modulation of telephone circuits when operated by carrier currents.

5. Noise induced from electrical power and traction systems.

6. Telegraph crosstalk from other telegraph channels, e. g.

- a) production of odd harmonics of the telegraph carrier frequencies in certain channels falling within the pass band of other channels;

- b) intermodulation in filter coils etc.

7. Variations of power supplies affecting the amplifier and detector of the V. F. telegraph channel and sometimes the receiving relay.

8. The effects of mechanical vibration upon valves (microphonicity) and relays.
9. Bad contacts (e. g. test points and valve bases) and badly soldered joints.
10. Deterioration of component parts, e. g. ageing valves.
11. Failure of power supplies, e. g. on changeover from main to reserve supply.
12. Accidental disconnections made during the course of maintenance and construction works.

that these disturbances account for practically all the distortion in telegraph channels except for characteristic distortion (which is chiefly a function of filter and amplifier — detector design), some bias (due to misadjustment of controls and relays etc.) and, in the case of the lower frequency channels, the distortion which arises from the low ratio of carrier frequency to signalling frequency;

that many of the causes of disturbance are individually negligible and the more important of the other have been found, in the experience of several Administrations, to be capable of elimination by careful maintenance both on the V. F. telegraph equipment and at all points on the telephone circuit;

that the C. C. I. F. are also studying the causes of disturbance in telephone circuits and the precautions to be taken to minimise their occurrence (C. C. I. F. Document 15 1950/1951, pages 3—26 refer);

and that the results of the C. C. I. F. study will be of great importance to the C. C. I. T.;

that, as a result of the considerable investigations already made by certain Administrations on the causes of disturbances in telephone and telegraph circuits, the relative order of importance of these causes appears to be approximately as follows :

a) in the case of telephone circuits :

- high resistance and unsoldered connections;
- noisy and microphonic valves, and poor contact between valve pins and valve holders;
- working parties engaged on cable operations;
- noisy and high-resistance U-links;
- changes in line level not compensated at the detector input;
- cross talk;
- errors in setting up, for example incorrect equalisation, line transformers incorrectly connected, faulty components;

b) in the case of V. F. telegraph equipment :

- high resistance and unsoldered connections;
- valves deteriorated beyond permissible limits;
- bad contacts;
- faults on power changeover equipment;
- frequency error of the carrier supply,

declares the view

that it is desirable for Administrations to undertake investigations of the causes, and frequency of occurrence of disturbances on V. F. telegraph channels routed on the various types of telephone circuit likely to be employed for international telegraph circuits;

that in doing these tests and in order that the results may be of the greatest use to the C. C. I. T. the incidence of disturbances should be measured according to their duration as follows :

- a) disturbances of duration more than 20 milliseconds;*
- b) disturbances of duration more than 150 milliseconds;*
- c) disturbances of duration more than 300 milliseconds;*

that the results should be segregated according to the type of telephone circuit, viz, audio or carrier, cable or aerial.

Provisional Recommendation No. II/12 (712). Appearance of false calling and clearing signals in circuits operated by switched teleprinter services

The C. C. I. T.,

in view of Provisional Recommendation No. II/11 (711), on the causes of disturbances affecting signals in telegraph channels, and their effect on the distortion of telegraph signals;

(712)

considering

that precautions should be taken with circuits used in switched teleprinter services to prevent the appearance of parasitic signals which would give rise to false calling and clearing signals,,

that special monitoring or indicating devices should be provided on voice-frequency telegraph systems, the channels of which are used for international switched circuits,

that special steps might well be taken to discover the causes of false signals due to transient changes in transmission level or momentary increases in noise level, on voice-frequency telegraph circuits,

that it would be desirable to reach agreement with the C. C. I. F. on operating standards in this connection,

declares the view

that the following precautions should be taken :

a) to avoid false clearing signals — the security and stability of power supplies and of sources of carrier frequencies, both telegraph and telephone, should be ensured;

a characteristic marking should be used to denote telegraph and telephone circuits used for the operation of switched teleprinter circuits, both in terminal and intermediate stations; precise instructions should be given to staff in order that false entry into the above-mentioned circuits may be avoided;

the number of non-soldered connections should be reduced as much as possible, together with the number of break points, unsoldered connections, e. g. U links and screw terminals, etc., should be checked with particular care. In this connection, attention is drawn to the methods of inspection by vibration tests used by the United Kingdom Administration (described in Annex 2 of the reply to Question 4, C. C. I. F. Study Group 3, 1950/1951. Document No. 15, pages 6 to 26, and especially pages 13, 18 and 22);

the amplitude of variations in the equivalent of telegraph circuits used for voice-frequency telegraphy should be limited, and abrupt variations in this equivalent should be studiously avoided;

b) to avoid false call signals :

limit the cross-talk mentioned in Provisional Recommendation No. II/11 (711);

limit induced voltage caused by electric power or traction systems;

limit the microphonicity of valves in repeaters and of valves used in voice-frequency telegraphy;

reduce the sensitivity of voice-frequency modulators and receivers to disturbing signals, while keeping an adequate margin for regulation of level;

avoid, in switched teleprinter services, the use of supervision signals having a short duration in relation to the transitory phenomena due to filters and time-constants in the level-regulators of voice-frequency telegraph systems;

these precautions, inasmuch as they concern telephone circuits used for voice-frequency telegraphy, must be taken simultaneously on normal and relief circuits;

for the permanent monitoring of groups of voice-frequency telegraph channels the lines of which are used for international switched circuits, it is advisable to use a monitoring channel. An alarm should be given to indicate when either the system or the monitoring channel is out of order;

it would be advisable to register the transmission level, in order to discover and localize the causes of the false signals on circuits behaving particularly badly;

it is not yet possible to lay down operating standards in this connection.

Recommendation No. 771. Protection of single-wire lines against variations in potential difference between the earth connections

The C. C. I. T.,

considering

that the protection of single-wire telegraph lines against disturbances produced by variations of the potential difference between the earth connections, should be determined in each case in relation to the length of the lines, the system of telegraphy used, the nature of the ground and the source of the variations of potential difference,

unanimously declares the view

that it appears inopportune to make recommendations on this subject for general application; that in cases where it is impossible to eliminate the disturbances in question, simply by careful placing of the earth connections, a study will be made of the use of special devices similar to those described in the Annex below.

ANNEX

Protective measures intended to reduce disturbances in telegraphic circuits due to the galvanic influence of electrified railways

Experience in operating electrified railway lines (protective measures aiming at reducing stray currents in the ground), has shown that the electrical connections on the rail joints are not kept up in a satisfactory condition. For this reason, in choosing the protective measures to be applied to the circuits of telegraphic connection, it would be better to consider the maximum possible stray currents.

For the protection of duplex telegraph circuits against the galvanic influence of direct current electrified railways, we have tried the following method, in which the line currents of the telegraphic circuit act upon the receiving relay via a magnetic coupling (the line is separated from the receiving telegraph apparatus by a transformer).

The basic wiring of the protection device constructed in accordance with this protection method is shown in figure 1, as it was proposed by the engineer Kostukov.

In this case, the duplex connection is established according to the principle of a bridge circuit. Instead of the telegraphic relay, the primary winding of a translator is inserted in the bridge diagonal. With a view to reducing the inductive influence of the neighbouring telegraphic circuits, an amplifier and a receiving relay are inserted in the secondary winding of this translator. A circuit composed of an inductance coil and a parallel condenser is connected by shunting on the primary winding of the translator.

In the secondary winding of the translator, a push-pull pulse amplifier is inserted, at the outlet of which a relay is connected.

In this wiring, the anti-induction circuit can be set up in such a way that the action of the induction currents will be reduced to a minimum.

The useful signal will be somewhat reduced, but, due to the presence of an amplifier, it will again attain the necessary value. A certain combination of the elements of the protection wiring may permit the reduction of the induction currents from $\frac{1}{4}$ to $\frac{1}{8}$ of their normal value, while making the received signal only 2 or 3 times weaker.

In this way, the relation between the values of the useful signal and of the induction current when it leaves the amplifier will be satisfactory, and the operation of the receiving relay will become quite stable.

The operation of the bridge circuit with push-pull amplifier, where transmitting and receiving is concerned, is well known and requires no explanation.

The induction currents coming from the line and having a peak shape and a duration of 0.25 to 0.3 at the most from that of the useful signal will pass mainly through the anti-induction circuit, but part of these currents will enter the primary winding of the translator, and, being amplified by the amplifier, can cause improper operation in the receiving relay in the intervals between the working impulsions.

In order to meet this difficulty, the armature of the receiving relay must be blocked by the local battery current.

The parasitic currents generated in the line as a result of the galvanic influence of the electrified railway or the influence of magnetic storms will branch out at point "a" like working currents.

The values of currents passing in the ground through a bridge arm and the transmitter, on the one hand, and on the other, through the primary winding of the translator, the inductance coil of the anti-induction circuit, the second bridge arm and the transmitter (see the diagram), are inversely proportionate to the effective resistances of these circuits.

As the speed of the variation of disturbing currents which are due to the galvanic influence of electrified railways is not great (see figure 2 c d), these currents in passing through the primary winding of the power transformer cannot induce a sufficient emf value in its secondary winding.

In the direct parasitic currents passing through the transformer winding do not attain values which could magnetize the iron of the power transformer to the saturation point, the operation of the receiving relays will remain the same whether disturbances are present or absent in the telegraphic circuit.

By selecting the required characteristics (effective resistance) in the inductance coil of the anti-induction circuit, it is possible to arrange that the currents passing through the winding of the power transformer do not exceed their admissible values.

A protective device constructed in accordance with this wiring may be indicated for considerable disturbing currents.

The disturbing currents due to the galvanic influence of electrified railways which have been observed in the U. S. S. R. (especially in the Ural region) were of 100 ma and, during magnetic storms, attained values of 150 ma. It is for that reason that the device for protecting telegraphic circuits against distortion has been worked out for disturbing currents up to 160 ma.

Figure 3 gives the curves of the variation of the currents J_k , J_{mp} , MJ_p , as a function of the frequency showing that induction currents (frequency harmonics above 40 c/s) pass principally through the protective circuit. These curves were obtained for a direct disturbing current, whose value in the line was 160 ma.

This device was tested under the service conditions of a telegraphic centre located close to the Ural electrified railway, and this test showed that the protective qualities of the wiring are entirely satisfactory.

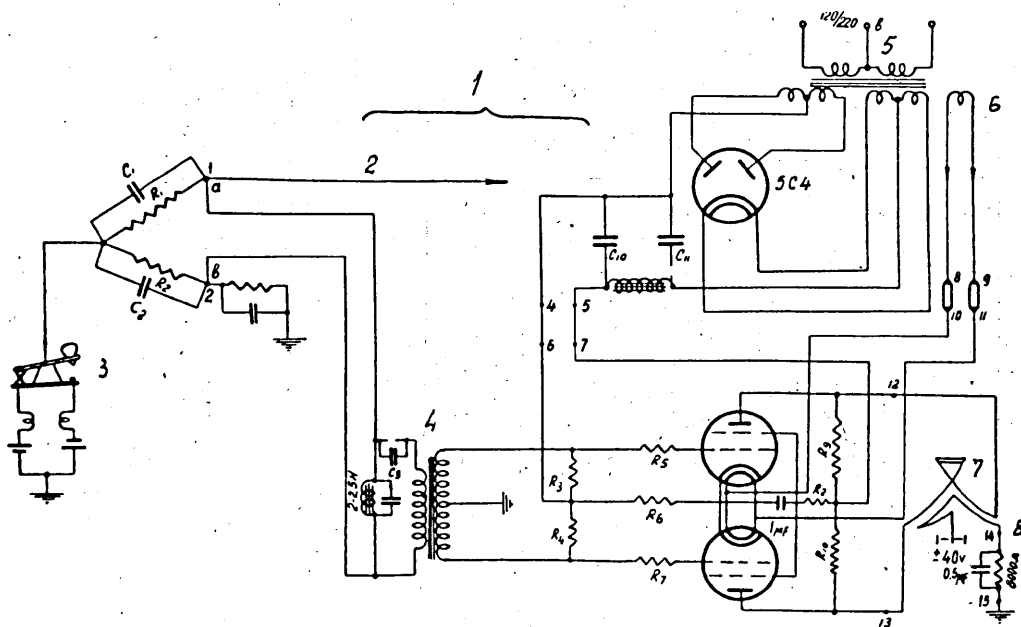


Fig. 1

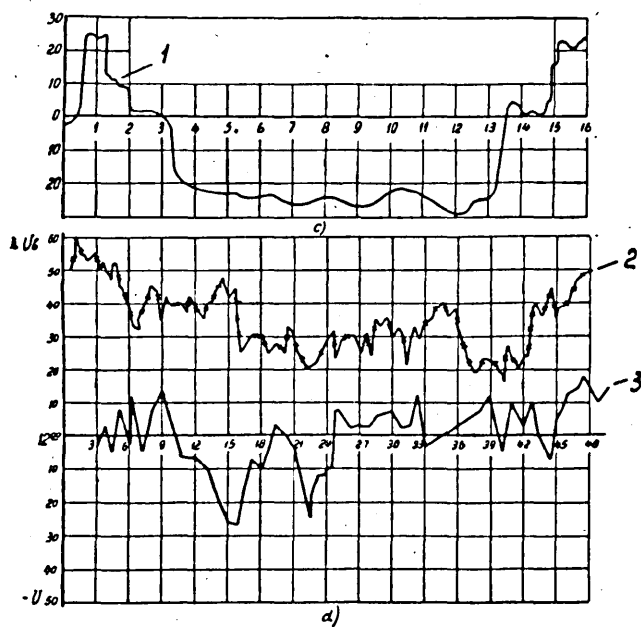


Fig. 2

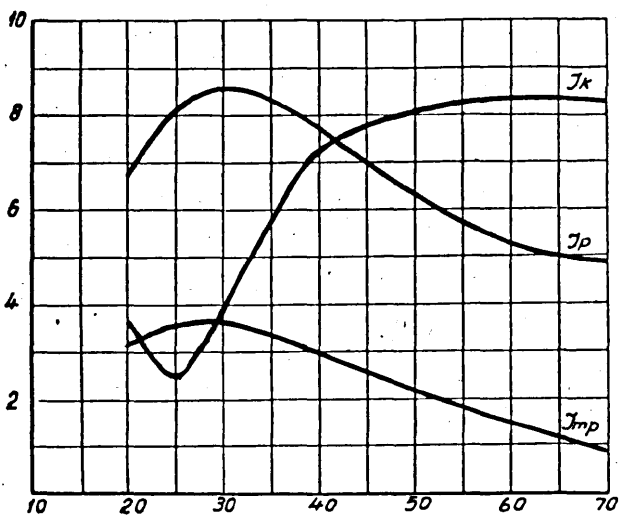
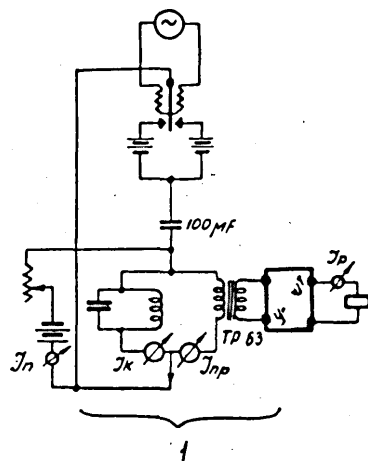


Fig. 3



Recommendation No. 801. Speed of transmission of telegrams

(See Question Geneva 19 allocated to S.G. IX)

The C. C. I. T.,

considering

that the present speed of telephonic communications and of airmail makes it necessary for Administrations to be acquainted with the times of transmission of telegrams, with a view to seeking possible means of improving them,

unanimously declares the view

a) that, as from 1949 *), Administrations should cause statistics of the speed of transmission to be compiled during three working days in the second fortnight of the month of October, such statistics to be drawn up by the receiving office in two returns and in accordance with the forms appended hereto;

b) that the Director of the C. C. I. T. should undertake to centralize the statistical data and to communicate the results, in suitable diagrammatic form, through the medium of the Secretary-General of the Union for publication in the Telecommunication Journal;

c) that, although it is not at present possible to fix a maximum time for the transmission of international telegrams, it is nevertheless desirable :

1. that 75 % of the telegrams originating in the locality of the sending office should be transmitted to the receiving office within a period of 30 minutes;
2. that 75 % of the other telegrams from the country of the sending office should be transmitted to the receiving office within a period of 45 minutes.

Return A

Country :

Return of speed of transmission, on important connections **) of ordinary telegrams received between 9.00 and 19.00, originating in the locality of the sending office.

Connection :		Method of operation (apparatus, wire, wireless)	Number of telegrams received within a period of					Total of telegrams checked	Remarks
Sending offices '1)	Receiving offices '1)		15 min.	16—30 min.	31—60 min.	61—120 min.	over 120 min.		
between time of acceptance and time of receipt									
Totals Percentages									

Notes : ¹⁾ Offices in the connected country, linked direct with offices in the country which keeps the statistics.

²⁾ Corresponding offices in the country which keeps the statistics.

*) In 1948, Returns A and B shall be taken in accordance with the indications of Return B; the statistical information shall be centralized and published in accordance with para b) by the Secretary-General of the Union.

**) The two terminal Administrations to agree as to the connections which can be left out of the statistics.

Return B

Country :

Return of the speed in transmission, on important connections *) of ordinary telegrams received between 9.00 and 19.00, originating in a locality other than that of the sending office, but in the same country.

Connection :		Method of operation (apparatus, wire, wireless)	Number of telegrams received within a period of						Total of telegrams checked	Remarks
Sending offices '1)	Receiving offices '1)		15 min.	16—30 min.	31—45 min.	46—60 min.	61—120 min.	over 120 min.		
			between time of acceptance and time of receipt							
Totals Percentages										

Notes : ¹⁾ Offices in the connected country, linked direct with offices in the country which keeps the statistics.

^{a)} Corresponding offices in the country which keeps the statistics.

*) The two terminal Administrations to agree as to the connections which can be left out of the statistics.

Recommendation No. 805. Technical methods of reducing transmission delays

The C. C. I. T.,

unanimously declares the view

that the Administrations should be requested to examine :

a) whether it would not be possible, with the object of speeding up the transmission of telegrams, to instal more modern apparatus for every circuit which is still operated with obsolete apparatus;

b) whether the service is carried out as it should be in all respects, whether the times shown are determined in an exact and reliable manner, whether or not a perforated band transmitter service is causing delays and whether perforated band transmission apparatus which is unsuited to the service should not be replaced by more modern apparatus.

Recommendation No. 808. Acceleration of transmission and delivery of international telegrams

The C. C. I. T.,

considering

the competition with the telegraph service of other rapid means of communication,

unanimously declares the view

a) that it is desirable to accelerate the transmission and delivery of telegrams, and to generalize such methods as have proved themselves effective;

b) that Administrations taking steps to promote the use of international telegraphy and to accelerate the delivery of telegrams, should be invited to communicate the action taken to the C. C. I. T.

**** Recommendation No. 841. Government telegrams**

(Has become obsolete since Paris Conference 1949)

**** Recommendation No. 842. Rates for government telegrams**

(Has become obsolete since Paris Conference 1949)

**** Recommendation No. 851. Error signal**

(Has become obsolete since Paris Conference 1949)

*** Recommendation No. 861. Draft regulations for the Subscribers' Telegraph Service by start-stop apparatus in the European system**

(New text in conformity with Provisional Recommendation XI/7)

The C. C. I. T.

declares the view

that the following Regulations should be adopted for the Subscribers' Telegraph Service in the European system :

REGULATIONS FOR THE SUBSCRIBERS' TELEGRAPH SERVICE BY START-STOP APPARATUS IN THE EUROPEAN SYSTEM

CHAPTER I

Application of the Regulations — Definitions

Article 1

General provision

These Regulations fix the rules to be followed for the subscribers' telegraph service, permitting the users to communicate directly and temporarily by means of start-stop apparatus. This service is called a telex service.

Article 2

Scope of the Regulations

(1) The provisions of the present Regulations shall apply to the international telex services of the European system as defined by the Telegraph Regulations.

(2) Countries outside the European system may decide to apply the provisions of the present Regulations.

Article 3

Definitions

1. Booking of a telex call :

The initial request made by a subscriber for obtaining a telex call.

2. Telex call :

The effect given to the booking of a telex call when communication has been established between the calling and the called stations.

3. Government telex call :

See article 11.

4. Service telex call :

See article 12.

5. Ordinary private call :

See article 13.

6. Subscription telex call :

See article 14.

7. Direct telex call :

Telex call established by means of a single international telex circuit.

8. Telex transit call :

Telex call established by means of more than one international telex circuit.

9. Telex exchange :

Installation permitting establishment of telex calls.

10. *Telex circuit :*

An electric connexion permitting the establishment of a telex communication between two telex exchanges.

11. *International telex circuit :*

Telex circuit connecting two telex exchanges in two different countries.

12. *Direct transit telex circuit :*

International telex circuit passing through one or more transit countries but involving no intermediate telex exchange.

13. *International telex terminal exchange :*

A telex exchange at the end of an international telex circuit.

14. *Chargeable duration of a telex call :*

The period of time to be considered for calculating the charge for this call.

15. *Unit charge in a particular international telex service :*

Charge for an ordinary three-minute telex call during periods when no tariff reductions are operative.

16. *Normal telex route :*

The route which must be chosen in the first place, for passing telex traffic in a particular service.

17. *Auxiliary telex route :*

A route (other than the normal route) to be used whenever it is in the interest of rapidity of the service. Unless there is agreement to the contrary between the countries concerned, the auxiliary telex route shall pass through the same countries as the normal route.

18. *Emergency telex route :*

A route to be used in case of complete interruption or major breakdown of the normal and auxiliary routes. Its itinerary differs from that of the normal or auxiliary telex routes, either because it does not pass through all the countries traversed by the normal or auxiliary routes, or because it traverses one or more countries through which the normal or auxiliary telex routes do not pass.

19. *International telex position :*

Manual position in an international terminal telex exchange, for establishing telex calls between two countries.

20. *International telex transit exchanges :*

An international telex terminal exchange which has been chosen to establish telex communications between two countries other than its own.

CHAPTER II

International telex network

Nature and duration of the telex service

Article 4

Constitution of international telex circuits

- § 1. International telex circuits are made up by means of telegraph circuits.
- § 2. The networks of the countries operating the telex service shall be connected, as far as possible, directly.
- § 3. In case of breakdown, any defective international circuit (or section of an international circuit) must be repaired with all requisite speed, and, pending repair, must be replaced so far as possible and with the minimum delay.
- § 4. Each intermediate administration (or recognized private operating agency) shall provide the sections of international circuits passing through the territory which it serves.

- § 5. For each relation, the administrations (and/or recognized private operating agencies) concerned shall determine, by mutual agreement, on one or more normal telex routes, when necessary, on auxiliary telex routes, and, in appropriate cases, on emergency telex routes.
- § 6. In this respect, the administrations (and/or recognized private operating agencies) shall conform, as far as possible, with the principles recommended by the C. C. I. T. as regards the constitution and maintenance of circuits and installations.
- § 7. If it should become necessary to use the auxiliary or emergency telex routes, the countries concerned shall take urgent measures to make them available.
- § 8. The General Secretariat shall keep up-to-date a list of international telex circuits.

Article 5

Rapid telex service

- § 1. As far as possible, the telex service is effected as a demand service. Hence the number of circuits between two networks and the number of positions operated at the international telex exchange shall be calculated as for such traffic.
- § 2. When the telex service is effected normally as a demand service, no priority shall be given to certain classes of telex calls.
- § 3. In cases of congestion or faults, and generally in cases when the telex service, temporarily, is not effected as a demand service, the provisions of article 19, on priority of communications, shall be in force.

Article 6

Duration of service

Legal time

- § 1. Each administration (or recognized private operating agency) shall fix the hours of working of its exchanges.
- § 2. The administrations (and/or recognized private operating agencies) concerned shall arrange, so far as possible, to fix the same period of working at neighbouring frontier exchanges which have close relations with each other.
- § 3. International telex terminal exchanges must, so far as possible, afford continuous service.
- § 4. Exchanges which are not open continuously shall be bound to prolong the service 12 minutes beyond the normal closing hours in favour of telex calls actually proceeding and those already prepared.
- § 5. Exchanges shall use the legal time of their country or of their zone. Each administration (or recognized private operating agency) shall notify this time or times to the General Secretariat which will advise the other administrations (and/or recognized private operating agencies).

CHAPTER III

General provisions relating to telex correspondence

Article 7

Restrictions on the use of a telex station

- § 1. Administrations reserve the right to suspend the telex service in the cases mentioned in articles 29 and 30 of the Convention.
- § 2. Subscribers to the telex service are forbidden to transmit to subscribers of another country telegrams intended for re-direction by telegraph with the intention of evading payment of the full charges due on such correspondence for the whole route, and administrations (and/or recognized private operating agencies) must refuse to offer telex service to a telegraphic reforwarding agency well known to be organized for such a purpose.

CHAPTER IV

Directories

Article 8

Compilation of directories

- § 1. As far as possible each administration (or recognized private operating agency) publishes a directory of its subscribers at least once a year (for example, on 1st April).
- § 2. The directory must have the uniform dimensions of 210 mm × 148 — (A 5).
- § 3. (1) The directory shall be composed of two separate lists, *a list of subscribers* and *a list of answer back codes*.
- (2) The *list of subscribers* shall be drawn up :
- a) in the alphabetical order of the towns where the stations are located;
- b) within this first classification, in the alphabetical order of the subscribers' names.
- (3) It shall be arranged according to the following model :

Town	Subscriber's name and address	Subscriber's exchange	Call number	Answer-back code
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- (4) The *list of answer-back codes* shall be compiled in alphabetical order on the following model :

Answer-back code	Subscriber's name and address	Subscriber's exchange	Call number
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- § 4. (1) The directories sent to the administrations (and/or recognized private operating agencies) of a country shall be set up in Roman script.
- (2) When they are written in a language other than the language used in that country, they shall be accompanied by an explanatory note to facilitate the use of such directories. This note shall be drawn up in whatever official language of the Union shall have been agreed upon by the administrations (and/or recognized private operating agencies) concerned.
- § 5. (1) Once a quarter (for instance, 1st July, 1st October, 1st January) each administration (or recognized private operating agency) shall send to the other administrations a supplement to its directory, containing all the changes that have occurred in the position of its network during the preceding quarter.
- (2) The arrangement and lay-out of the supplements must be exactly the same as those of the directories (see § 2 and § 3 above).

Article 9

Supply of directories

- § 1. Each administration (or recognized private operating agency) shall supply free of charge to the administrations (and/or recognized private operating agencies) of the countries with which telex service is open, a sufficient number of copies of its subscribers' lists for the benefit of the performance of the service.

- § 2. (1) In order to be able to cope with the subscriber's demands each administration (or recognized private operating agency) must inform the other administrations (and/or recognized private operating agencies) not later than 1st February, how many directories it will require.
 (2) Unless otherwise arranged, these directories shall also be supplied to the administrations (and/or recognized private operating agencies) free of charge.
- § 3. (1) A subscriber wishing to obtain a copy of the telex directory of another country must apply to his own administration (or recognized private operating agency).
 (2) If an application for its directory is received direct by an administration (or recognized private operating agency) from a subscriber in a foreign country, the request shall be forwarded by that administration (or recognized private operating agency) to the administration (or recognized private operating agency) of the subscriber's country.

CHAPTER V

Classes of telex calls

Article 10

Classes of telex calls

- § 1. The following classes of telex calls shall be admitted :
- a) Government telex calls;
 - b) Service telex calls;
 - c) Ordinary private telex calls;
 - d) Requests for information.
- § 2. In addition *subscription* calls may be admitted by special agreement between administrations (and/or recognized private operating agencies) concerned. In such cases the provisions of articles 14 and 33 apply.
- § 3. Administrations (and/or recognized private operating agencies) may decide by special agreement amongst themselves to admit classes of telex calls other than those mentioned above.

Article 11

Government telex calls

- § 1. By analogy with the definition given in Annex 2 to the Convention, *Government telex calls* are those originating with one of the authorities specified below :
- a) the Head of a state;
 - b) the Head of a government and members of a government;
 - c) the Head of a colony, protectorate, overseas territory or territory under sovereignty, authority, trusteeship or mandate of a Member or Associate Member or of the United Nations;
 - d) commanders-in-chief of military forces, land, sea, or air;
 - e) diplomatic or consular agents;
 - f) the Secretary General of the United Nations and the heads of the subsidiary organs of the United Nations;
 - g) the International Court of Justice at the Hague.
- § 2. The person booking a government telex call shall be required, if asked to do so, to state his name and rank.
- § 3. A government telex call shall have priority only if priority has been specifically requested by the calling subscriber.

Article 12

Service telex calls

- § 1. (1) *Service telex calls* are those which relate to the working of the international telex or telegraph service; such calls may be exchanged free of charge between the administrations (and/or recognized private operating agencies) concerned with the international telex service.
- (2) However, in services between administrations of the European system, the telephone service may use free of charge the telex service conducted by administrations of the European system for the exchange of telex calls concerning the working of the international telephone service, which shall then be regarded as service telex calls.
- § 2. Service telex calls may be requested only by persons authorized to do so by their respective administration (or recognized private operating agency).
- § 3. The Secretary General of the Union and the Directors of the International Consultative Committees are authorized to request service telex calls.
- § 4. Service telex calls must be made, so far as possible, outside the busiest hours.

Article 13

Ordinary private telex calls

Ordinary private telex calls are telex calls, other than service or government calls, which do not receive any special treatment.

Article 14

Subscription telex calls

- § 1. *Subscription telex calls* are those which are arranged to take place daily, between the same posts, at the same time agreed upon in advance, for the same duration, and which have been booked for at least one whole month, or for one or more indivisible periods of seven consecutive days.
- § 2. Subscription telex calls must relate exclusively to the personal affairs of the correspondents or those of their firms.
- § 3. (1) Subscription telex calls shall be subject to the acceptance, by the person requiring them, of a subscription contract. The subscription contract may take effect from any date, but for those taken on a monthly basis the first day of the month shall be regarded as the commencing date. Any balance of payment due for service given prior to that date shall be added to the first monthly account.
- (2) The monthly subscription shall be extended from month to month unless it has been cancelled by either party at least eight days before the end of the current month. Nevertheless, by agreement between the Administration (and/or recognized private operating agencies) concerned, earlier cancellation may be permitted, after the first month subject to eight days notice being given in advance.
- (3) A subscription contract made for one or more indivisible periods of seven consecutive days shall not be renewable by tacit agreement.
- § 4. The time and duration of subscription telex calls shall be fixed by the international telex terminal exchanges concerned, with due regard to the subscriber's request and the commitments of the service.
- § 5. If, at the time specified in the subscription contract, there is, between the international telex terminal exchanges concerned, a circuit on which no telex call is in progress and on which there is no priority government call on hand, the call shall be set up at the time fixed. Otherwise, it shall be set up as soon as possible on the first circuit fulfilling these conditions after the time fixed.
- § 6. A subscription telex call shall be definitely disconnected when the caller gives the signal that the call is ended before the expiry of the duration specified for each subscription call. If, at the end of this duration, the caller has not already given the signal that the call is ended, the operator shall warn the caller and disconnect the call, unless the call can be continued without blocking other traffic.
- § 7. Subscribers shall arrange for their stations to be free at the time fixed for the call.

Article 15

Requests for information

A request for information is a request made by a person with the object of ascertaining :

- a) whether a certain person, whose name is given, together with the additional details necessary for identification (for example, his complete address), is a telex subscriber, and, if so, what is his call number and answer-back code.
- b) the name of the person to whom a given call number or answer-back code in a specified telex system is allotted.

CHAPTER VI

Booking of telex calls

Article 16

Form of booking of telex calls

In the booking of a call, the telex installation of the subscriber required must be designated by the name of the country, the subscriber's exchange and call number, as it appears in the official directory of the country concerned.

Article 17

Validity of telex bookings

In case the telex service is not effected on a demand basis, bookings of telex calls not completed shall cease to be valid :

- (1) where all the exchanges concerned are open continuously :
 - a) at midnight, if the telex call has been booked before 10 p. m. on the same day;
 - b) at 8 a. m. if the telex call has been booked after 10 p. m. the previous evening.
- (2) Where all the exchanges concerned are not open continuously : at the time of closing of the telex service at the end of the day.

Article 18

Modification of telex bookings

§ 1. In the case of all bookings of telex calls, and subject to the provisions of article 17, relative to the validity of bookings, the caller may, so long as the required subscriber has not been obtained :

- a) cancel his booking;
- b) specify the time after which the booking should be cancelled;
- c) change the number of the station required within the territory of the country of destination.

§ 2. Modifications of bookings shall be permitted free of charge; the administration (or recognized private operating agency) of origin may, however, make a special charge covering the additional work of recording. This charge shall not enter into the international accounts.

CHAPTER VII

Priority and operating procedure

Article 19

Priority of telex calls

§ 1. In the circumstances envisaged in article 5, § 3, international telex calls shall be connected in the following order :

- a) service calls concerning the re-establishment of international telecommunication links which have been totally interrupted;

- b) Government telex calls for which priority has specifically been requested;
 - c) Government telex calls for which priority has not been requested, ordinary private telex calls, service telex calls other than those mentioned in a).
- § 2. In the international telex terminal exchange, calls shall take rank according to their category and the time of their receipt at this exchange. (see article 20 § 6 (2)).

Article 20

Establishment and disconnection of telex calls

- § 1. Administrations (and/or recognized private operating agencies) shall agree directly between themselves upon the most appropriate method of operation to be applied in the international relations that concern them, account being taken of the undermentioned provisions.
- § 2. In the manual service, all bookings, modifications of bookings and advices of cancellation shall be transmitted as quickly as possible to the international telex terminal exchange charged with establishing the telex calls booked.
- § 3. In the manual service calling signals on international circuits must be answered immediately. If, after a suitable period of calling the exchange called does not reply, it shall be asked by any appropriate means to resume the service on the international circuit in question; any international telex terminal exchange that is in a position to help in this matter must do so.
- § 4. For the operation of international telex circuits, the French language shall be used between administrations (and/or recognized private operating agencies) having different languages, in the absence of special agreements between them for the use of other languages.
- § 5. International telex terminal exchanges connected with each other by several international telex circuits, may, by mutual agreement, allocate certain of these circuits specially for the establishment of telex transit calls or for the passing of telex traffic in one direction only.
- § 6. (1) When there is congestion on a particular international telex route, recourse may be had to the advance preparation of calls. Preparation shall consist in completing all the operations necessary in order that the two stations (calling and called) may be connected together without any loss of time on the international circuit.
- (2) On circuits which have not been allocated for the passing of traffic in a single direction, telex calls of the same category are, in principle, established in alternate order; the international telex terminal exchanges concerned may, by mutual agreement, modify temporarily the conditions of alternation, if that would be advantageous from the point of view of the flow of traffic and maintenance of the chronological order, as laid down in article 19, § 2.
- (3) Telex calls already prepared must not be delayed for the benefit of calls of superior rank.
- § 7. Without prejudice to the provisions of article 25 the operator directing the calls at the international telex position shall verify that transmission between the correspondents is satisfactory; he shall note the time when the call is established as well as the time when the telex call ends and/or its duration. He shall record service incidents and other items, necessary for the preparation of the international accounts.
- § 8. Operators are strictly forbidden to break into a call.

Article 21

Limitation of the duration of telex calls

- § 1. (1) In general, the duration of ordinary private telex calls and service telex calls shall not be limited.
- (2) In exceptional conditions of congestion the administrations (and/or recognized private operating agencies) concerned may, however, agree to limit the duration of such calls to twelve minutes in certain specified services.
- § 2. (1) The duration of government telex calls shall not be limited.
- (2) However, transit administrations (and/or transit recognized private operating agencies) shall have the right, in the case of breakdown or congestion, to limit the duration of government telex calls to

twelve minutes when these calls are established through the intermediary of one of their exchanges.
(3) The operator of the transit country in such a case shall advise the controlling operator that restrictions on duration are in force.

- § 3. If the duration of the call is limited, the caller shall be informed, when the call is about to be connected, that it will be cut off after the due time.

Article 22

Organization of the rapid telex service by telegraph circuits

- § 1. It is strongly recommended that the telex network of each country be on an automatic switching basis and that the operator of the originating international telex position be able to select the called subscriber directly.
- § 2. Wherever the above conditions are realized, the operator of the originating international telex position will receive the demand, and establish and control the call. The equipment of the outgoing position must be adapted to that of the telex network of the country of destination.
- § 3. The operator of the originating international position must be acquainted with the necessary operating particulars of the network of the country of destination. The administration of arrival will give all the necessary technical information to the administration of departure.
- § 4. Two administrations may agree to introduce automatic switching by direct selection between the subscribers of their respective networks without the assistance of an international telex position.
- § 5. If the two networks employ manual switching, the conditions must be such as to permit, as far as possible, of demand service; the calls must be controlled by the operator of the originating country.
- § 6. (1) If one network employs manual switching and the other automatic switching, the originating international telex position will control the call.
(2) If, however, the country of destination has an automatic switching system, the administrations interested may agree to allow the operator of the originating international telex position to select directly the called subscriber where the conditions of § 2 and § 3 above are realized.
(3) Inversely, if it is the originating country that has an automatic switching system the administrations concerned may agree to allow calls from the originating country to arrive automatically at the international telex position in the country of destination which will control these calls.

Article 23

Signalling in the service

- § 1. (1) The *free line* is characterized by a permanent signal corresponding to the "start" signal in accordance with International Telegraph Alphabet No. 2.
(2) The *call* is characterized by a signal corresponding to the permanent inversion of the "start" signal in accordance with International Telegraph Alphabet No. 2.
(3) *Clearing* is characterized by a signal corresponding to the "start" signal in accordance with International Telegraph Alphabet No. 2 maintained for a period of at least 0.3 second.
- § 2. Precautions must be taken :
a) to avoid false calling and clearing signals; (to this end telex circuits must be of high grade).
b) to avoid the establishment of a wrong connexion on an automatic switching system in the event of a false clearing signal occurring on an established connexion.

Article 24

Supplementary provisions for signalling

- § 1. The international telex position must be equipped in such a way as to receive the clearing signal from both sides.
- § 2. A signal to recall the operator of that position to an established connexion is not foreseen.
- § 3. Precautions must be taken that in the event of the operator of the international telex position delaying to remove the plug on reception of the clearing signals, a new call from a subscriber on one network shall not pass to the other network.

- § 4. When communication has been established, the answer-back signals of apparatus used at the intermediate telex positions must not be sent to line, when figure-shift D is received.
- § 5. The international telex position must be provided with equipment to determine the chargeable time of calls controlled by these positions, this timing equipment to be brought into operation in accordance with the provisions of article 25, but to be stopped on receipt of the first clearing signal.
- § 6. (1) The subscriber's equipment must be arranged in such a way that :
- a) a call can be received, the answer-back taken, the message transmitted and the connexion cleared without the intervention of the called subscriber;
 - b) the motor of the teleprinter will rotate continuously for the duration of an established telex connexion;
- (2) When a subscriber's equipment is connected with a line used by the telephone as well, the stipulations of this paragraph are not necessarily applicable.

Article 25

Operating procedure on international telex position

- § 1. (1) If the called subscriber can be obtained directly by the controlling international telex operator (according to article 22), this operator :
- a) holds the calling subscriber and selects a free circuit;
 - b) selects the called subscriber;
 - c) establishes communication with the called subscriber and obtains the answer-back of the called subscriber which must also be received by the calling subscriber;
 - d) obtains the answer-back of the calling subscriber which must also be received by the called subscriber;
 - e) operates the timing equipment;
 - f) on reception of the clearing signal, clears down the connection.
- (2) If the called subscriber is engaged, the controlling international telex operator signals OCC RAP and cuts off the calling subscriber.
- § 2. (1) If the called subscriber is obtained by two international telex positions :
- a) the controlling international telex operator holds the calling subscriber and selects a free circuit;
 - b) the operator at the second international telex position announces himself by the abbreviated name of his telex exchange ¹⁾;
 - c) the controlling international telex operator signals the particulars of the called subscriber;
 - d) the operator of the second international telex position :
 1. holds the circuit from the international telex position at which the call is controlled,
 2. selects the called subscriber,
 3. signals the letters DF to the controlling international telex position,
 4. establishes communication between it and the called subscriber;
 - e) the controlling international telex operator :
 1. establishes communication with the calling subscriber and obtains the answer-back of the called subscriber, which must be received at the same time by the calling subscriber,
 2. obtains the answer-back of the calling subscriber which must also be received by the called subscriber,
 3. operates the timing equipment;
 4. on receiving the clearing signal, clears down the connexion.
- (2) If the called subscriber is engaged, the operator of the second international telex position signals OCC and clears down the international circuit.

¹⁾ It is recommended that, as far as possible, the abbreviated name of the telex exchange shall be transmitted by means of the answer-back unit and shall be so constituted as to permit the identification of the operator's position concerned in the connexion of an international call.

- § 3. (1) If the called subscriber is obtained by more than two international telex positions :
- a) the controlling international telex operator holds the calling subscriber and selects a free circuit;
 - b) the operator at the second telex position announces himself by his abbreviated name (see § 2 (1 b));
 - c) the controlling international telex operator signals the particulars of the called subscriber;
 - d) the operator at the second international telex position connects the third international telex position and signals THRU to the calling international telex position;
 - e) the operator of the third international telex position announces himself by his abbreviated name (see § 2 (1 b));
 - f) the controlling international telex operator signals the particulars of the called subscriber;
 - g) the operator of the third international telex position :
 - 1. holds the circuit from the international telex position at which the call is controlled,
 - 2. selects the required subscriber,
 - 3. signals the letters DF to the controlling international telex position;
 - 4. establishes communication between it and the called subscriber;
 - h) the controlling international telex operator :
 - 1. establishes the communication with the calling subscriber,
 - 2. obtains the answer-back of the called subscriber, which must also be received by the calling subscriber,
 - 3. obtains the answer-back of the calling subscriber, which must also be received by the called subscriber,
 - 4. operates the timing equipment,
 - 5. on receiving the clearing signal, cleans down the connexion.
- (2) If the operator of the second international telex position finds all the circuits to the third position engaged, he should signal NC and clear down the international circuit.
- (3) If the called subscriber is engaged, the international telex operator of the exchange of arrival should follow the procedure indicated in § 2 (2).
- § 4. All instructions necessary for the efficient handling of a subscriber's international telex traffic may only be given to that subscriber through the medium of the international terminal exchange to which he is connected.

Article 26

Service correspondence

In service correspondence the following code expressions should be used :

BK	I cut off
CFM	confirm
COL	collation
CRV	how do you receive ?
DER	out of order
DF	you are in communication with the called subscriber
FIN	I have nothing more to transmit
FS	to follow
G	you may transmit
MNS	minutes
MOM	wait, waiting
MP	personal delivery
NA	correspondence to this subscriber is not admitted
NC	no circuits
NP	the called party is not, or is no longer a subscriber
OCC	subscriber is engaged
OK	agreed

P ¹⁾	stop your transmission
QOK	do you agree?
R	received
RAP	I will call you again
RM	bad reception
RPT	repeat
RPT AA	repeat all that follows
RPT WA	repeat the word after
SVP	please
TAX	what is the charge?
TEST SVP	please send a test message
THRU	you are in communication with a telex position
TLX	telex
TPR	teleprinter
W	words
EEE	error

CHAPTER VIII

Characteristics of the start-stop apparatus

Article 27

Characteristics of the start-stop apparatus

§ 1. The start-stop apparatus used in the telex service will have the following characteristics :

- (1) The transmission signals are those of the start-stop apparatus, based on the International Alphabet No. 2 as mentioned in the Telegraph Regulations.
- (2) The receivers shall be able to work with seven signals of equal duration.
- (3) The speed is 50 bauds.
- (4) The number of characters that a line of the page-printing apparatus may contain is fixed at 69.
- (5) The subscriber's start-stop apparatus must be equipped with an answer-back device having the subscriber's code, which is released by the signal corresponding to the secondary of letter "D".
- (6) The answer-back transmission comprises a series of 20 signals, as follows :

1 signal "letters"

1 carriage return

1 line-feed

1 signal "letters" or "figures" (as appropriate)

15 signals, at the choice of each administration, for the composition of the subscriber's code

1 signal "letters";

(7) When a subscriber's code is composed of less than 15 characters, as many "letters" signals are interspersed as are necessary to make up the 15, this being done with a view to giving the calling subscriber the possibility of seeing clearly the end of the transmission of the called subscriber's code.

(8) For the composition of the code, it is recommended that an abbreviated name designating the subscriber should be used, followed by the name of the locality where he resides; nevertheless, administrations are at liberty to employ any other way of composing the answer-back code, in particular by using the subscriber's number.

§ 2. The other characteristics of the start-stop apparatus shall conform to the recommendations of the C. C. I. T.

¹⁾ To be repeated until the transmission is brought to a stop.

CHAPTER IX

Tariffs and charging — Adjustment of charges and reimbursements

Article 28

Telex rates

- § 1. The unit charge is the charge in respect of an ordinary private telex call of three minutes' duration, effected during periods when no reduction in tariff is operative.
- § 2. The amount of the unit charge shall be fixed on the basis of the gold franc by agreement between the administrations (and/or recognized private operating agencies) concerned, in such a way that the charge for a telex call shall be, as far as possible, 50 % of the charge for a telephone call of the same duration, exchanged in the same relation at a time when no reduction in tariff is operative.
- § 3. The unit charge expressed in gold francs shall always be the same in both directions in a given relation, regardless of the telex route (normal, auxiliary, emergency) used for the establishment of a communication in this relation.
- § 4. (1) Any telex call of a duration of three minutes or less shall be charged as for three minutes.
(2) When the duration of a call exceeds three minutes, a charge per minute shall be made for the period in excess of the first three minutes. Any fraction of a minute shall be charged as for one minute. The charge per minute shall be one-third of the charge for three minutes.
- § 5. The provisions of this article shall not apply to services between frontier districts. The administrations (and/or recognized private operating agencies) shall determine by agreement between themselves the rate to be applied according to the case.

Article 29

Chargeable duration of a telex call

- § 1. The chargeable duration of a telex call begins at the moment the connection is established between the calling and the called subscribers and after the apparatus of the calling and the called subscribers have emitted their respective answer-back code.
- § 2. It ends the moment when the calling or called subscriber gives the clearing signal.
- § 3. After each telex call, the operator of the international telex position at the caller's end shall determine the chargeable duration of the call, unless different arrangements have been made by agreement between the administrations (and/or recognized private operating agencies) concerned, taking into account, where necessary, any difficulties of transmission or any incidents which he may observe. The operator may, if he considers it appropriate, agree on this subject with the international telex position on the side of the called subscriber.
- § 4. If after a call, a subscriber claims a reduction in charges as a result of difficulties or incidents during a call, he may be invited by his administration to supply copies of the message in question as transmitted and received. If the faults are clearly attributable to either of the subscribers, no reduction in the charge shall be made.

Article 30

Composition of the tariff

- § 1. The rates for telex calls referred to in article 28 shall be made up of the terminal rates and any transit rate or rates.
- § 2. (1) For the fixing of terminal rates, the territory of the administrations (and/or recognized private operating agencies) concerned may be divided into charge zones.
(2) Each administration (or recognized private operating agency) shall fix the number and extent of the charge zones for its services with each of the other administrations (and/or recognized private operating agencies).
- § 3. Each transit administration (or recognized private operating agency) shall fix its transit rate.

Article 31

Charging during periods of light traffic

- § 1. (1) Administrations (and/or recognized private operating agencies) shall decide between themselves during what periods of light traffic a reduction in rates may be considered.
 (2) In relations for which such arrangements have been made, the charge applied for any telex call during a period of light traffic shall be equal to three fifths (3/5) of the charge which would be applied to such a call during a period in which no reduction in charge is operative. This provision shall not, however, affect article 28, § 5.
- § 2. Telex calls extending into both the period during which no reduction in charge is operative and the period of light traffic shall be charged as follows :
- a) for a telex call not exceeding three minutes in duration; the tariff in force in the administration (or recognized private operating agency) of origin at the moment when the call begins;
 - b) for a telex call exceeding three minutes in duration : the first three minutes shall be charged in accordance with the traffic in force in the administration (or recognized private operating agency) of origin at the moment when the call begins; the additional minutes shall be charged in accordance with the tariff in force in the system of that administration (or recognized private operating agency) at the moment when each of these minutes begins.

Article 32

Charge for Government telex calls

Government telex calls shall be charged as ordinary private telex calls.

Article 33

Charge for subscription telex calls

- § 1. In general, subscription telex calls shall be subject to the charge for ordinary private telex calls of the same duration exchanged during the same period.
- § 2. However, if a demand service is impossible during certain periods of heavy traffic, as may be determined for each relation by the international telex terminal exchanges concerned, then administrations (and/or recognized private operating agencies) may agree between themselves to apply to subscription telex calls a charge as a maximum equal to twice the charge for an ordinary private telex call of the same duration, exchanged during a period in which no reduction for ordinary private telex calls is operative.
- § 3. When a telex demand service is in force in any particular relation, the administrations (and/or recognized private operating agencies) concerned may agree to admit subscription telex calls lasting longer than 60 minutes; these calls to be charged 75 % of the charge for the period in which the subscription call is in course.
- § 4. (1) The monthly subscription charge shall be reckoned on the basis of thirty days.
 (2) The monthly subscription charge may, however, be reckoned on the basis of twenty-five days, if the subscriber waives the use of his subscription on any one day of the week, being the same one each week and being specified in advance in the agreement.
 (3) The subscription charges for one or more periods of seven consecutive days shall be reckoned on the basis of seven days, but no reduction shall be admitted if the subscriber waives the use of one or more calls.

Article 34

Charges for requests for information

- § 1. A request for information is charged for in the international service only if it is not accompanied by the booking of a call and if also it involves the use of an international circuit.



- § 2. In such circumstances the charges made for the request for information shall be one third (1/3) of that pertaining to a three minute telex call exchanged between the person requesting the information and the person about whom the information is requested, during the charging period in which the request for information is forwarded by the international terminal exchange of origin.

Article 35

Right to round off charges

- § 1. The charges to be collected in accordance with agreements made between administrations (and/or recognized private operating agencies) may be rounded up or down to meet the monetary or other convenience of the country of origin.
- § 2. Modifications adopted by virtue of the foregoing paragraph shall apply only to the charge collected in the country of origin and shall not involve any alteration in the share of the charges proper to the other administrations (and/or recognized private operating agencies) concerned. The rates must be rounded up or down to the monetary unit or fraction of the monetary unit in use in the country concerned.

Article 36

Fixing of monetary equivalents¹⁾

- § 1. For the collection of charges from the public, each country should, in principle, apply to the rate expressed in gold francs an equivalent in its national currency approaching as nearly as possible to the value of the gold franc. However, when the equivalent is not applied or when the equivalent applied is less than the true equivalent the accounts shall nevertheless be prepared in gold francs in conformity with article 30.
- § 2. (1) Each country should, as far as practicable, notify to the General Secretariat the equivalent it has chosen, as well as the date from which it will collect charges according to such equivalent.
(2) The General Secretariat shall draw up a table of the information it receives and forward it to all Members and Associate Members. It shall also inform them of the date on which new charges based on any new equivalent come into force, and shall bring any subsequent information to their notice.

Article 37

Charges in particular cases

Adjustment of charges and reimbursements

- § 1. When, through the action of the telex service, correspondents experience difficulty in the course of a telex call, the chargeable duration of the call shall be reduced to the total time during which telex conditions have been satisfactory; the international telex position of origin shall decide, by virtue of article 29 § 3, whether the charge for the minimum period of three minutes shall be paid.
- § 2. (1) When, through the action of the correspondents, a subscription call has not taken place or has not lasted for the prescribed duration, no compensation shall be given and no reimbursement made.
(2) When, through the action of the telex service, it has not been possible for a subscription call to take place, or for it to last for the prescribed duration, such a call shall be replaced by a call of a duration equivalent to the time not used, to be exchanged as soon as practicable after the prescribed time, with priority over other calls of the same class. If the call cannot be replaced or made good in this manner, only the charge proper to the time used shall be included in the international accounts. In reckoning the charge for the time used, the charge relative to the whole time prescribed for a subscription call shall be taken as the basis, and this basic charge shall be equal to one twentyfifth (1/25) or one thirtieth (1/30) of the amount of the monthly subscription, irrespective of the month concerned. For a subscription call contract made for seven consecutive days, the basic charge shall be equal to one seventh (1/7) of the amount of the subscription.

¹⁾ Common provisions of the Telegraph and Telephone Regulations.

- § 3. (1) For any telex call, other than a subscription telex call, in case of refusal by the calling station, the cost of one minute of ordinary private call exchanged between the two stations concerned during the charge period in which the refusal took place shall be payable.
- (2) By agreement between the administrations (and/or recognized private operating agencies) concerned, a charge equal to that applied in the case of refusal may be made for any telex call other than a subscription telex call in the case of non-reply by the calling station at the moment when it is rung to take the call.
- § 4. A call booked with an incorrect number and established with the station having that number shall be charged as for a duration of three minutes. If the incorrect booking is replaced immediately by another booking of a call to the same country, however, only the cost of one minute's telex call exchanged during the charge period when the wrong number was requested shall be payable.

CHAPTER X

Accounting

Article 38

Accounting

- § 1. Unless otherwise arranged, the charges relating to the telex service shall form the subject of separate monthly accounts to be drawn up by the administration of the country of origin. These accounts shall be prepared in such a way as to show, for each taxable period, the number of minutes taxed in each category, grouped according to zones of destination. Furthermore, if the traffic has been transmitted by different channels, the traffic transmitted by each channel shall be mentioned separately, with an indication, if the case arises, whether it is an emergency channel, the use of which was not gratuitous.
- § 2. Except in the case of a special agreement between the administrations concerned, the administration of the country of origin shall transmit to the administration of the country of destination the monthly accounts in as many copies as there are countries concerned, including the countries of origin and destination. After final acceptance of the accounts, the administration of the country of destination shall send a copy of the account, endorsed with its acceptance, to the administration of the country of origin as well as to the administration of each other country concerned.
- § 3. (1) The provisions of the Telephone Regulations dealing with exchange and acceptance of accounts as well as conservation of vouchers and payment of balance are applicable.
- (2) The accepted monthly accounts should, however, be included in separate quarterly accounts presented in accordance with telephone procedure by the creditor transit and terminal administrations to the debtor terminal administrations. The settlement of the accounts can then be effected either with the Telephone or with the Telegraph Department of the creditor administrations by arrangement.

CHAPTER XI

Directives for subscribers

Article 39

Operating procedure for telex communication

For the transmission of a telex communication, the subscriber must follow the directions given him in an instruction drawn up in accordance with the detailed directives contained in the Annex No. 1 to the Regulations.

Annex No. 1

Operating procedure for telex communication

I. Formation of the text

- § 1. (1) The heterogeneous groups (composed of two or three sorts of characters : letters, figures, signs) are transmitted without spaces or interspacing signs, as well as the homogeneous groups (words, whole numbers,.....).
- (2) However, when a group, or part of a group, is composed of a whole number and an ordinary fraction, the fraction is separated from the number by means of a dash without space. Examples :
for "one and three quarters" : $1\frac{3}{4}$.
for "three quarters" followed by "eight" : $\frac{3}{4}-8$.
- § 2. The inverted commas sign (quotation mark) (« ») shall be signalled by transmitting the apostrophe sign (') twice, at the beginning and the end of the text within the inverted commas (quotation marks) (" ").
- § 3. To indicate the sign $\frac{1}{10}$ or $\frac{1}{100}$, the figure 0, the fraction bar, and the figures 0 or 00 shall be transmitted successively.
- § 4. When the accents on a letter are essential to the sense of the text, repeat at the end of the message the group containing such letter, placing this letter between two spaces. Examples :
ach e te for achète, achet e for acheté.
- § 5. Groups in which figures intervene (particularly numbers) to be repeated at the end of the message.
- § 6. To pass to the beginning of the next line, i. e. to start a new line, press first "carriage return", then "line feed", and again "carriage return".
- § 7. An error is corrected in the following manner :
 - a) in manual transmission, the signal "space" and the letter E are signalled alternately three times restarting the transmission from the last group correctly sent;
 - b) in perforating, the wrong group and everything following it is "effaced" by depressing the "letter" key.
- § 8. A subscriber preparing a perforated tape for automatic transmission must take care :
 - a) that the signal "who are you" does not appear on the tape;
 - b) that in starting a new line, the provisions of § 6 are followed;
 - c) that the tapes are perforated to the end. He should accordingly finish perforated tapes with a series of "letters" perforations.
- § 9. Letters or signs coupled with the letters F, G and H should not be used in international communications, except in the case of countries with which there are special arrangements. (Each country will inform its subscribers of the letters or signs used in the country as secondaries of letters F, G and H, will mark these distinctively on the keyboard, and will indicate the countries with which there are special arrangements.)

II. Operating procedure

- § 10. Since the establishment of a connection is always indicated by the transmission, through the intermediary of the international telex position, of the answer-back of the called subscriber followed by that of the calling subscriber, subscribers should not intervene before the transmission of these two codes is completed.
- § 11. (1) The caller checks whether the answer-back which he has received is in fact that of the called subscriber. (If it is not, he should interrupt the communication, and inform the international telex position.)
- (2) The calling subscriber can, however, check whether the connection is satisfactory by obtaining the code of the called subscriber.
- § 12. If he considers it desirable, he operates the call bell and ends with the change of line followed by "letters".

§ 13. The calling subscriber should then proceed as follows :

- a) he starts a new line (see § 6) and transmits the signal " letters ";
- b) he transmits any particulars of the message such as " urgent ", " acknowledge receipt ", etc.;
- c) he starts a new line;
- d) he transmits his message, starting a new line as often as necessary;
- e) he starts a new line;
- f) he repeats the groups mentioned in § 4 and § 5;
- g) if he has several messages, he follows each message by the groups to be checked, by the sign + and by starting a new line; the sign + is not sent after the last message;
- h) after the transmission of the message (or, as the case may be, of the last message), and/or of the groups to be checked, has been completed, he sends the signs + ?, followed by " letters ", thus indicating to the correspondent that the latter can transmit in his turn.
If he receives no reply, he signals his own code, and then obtains the answer-back of the correspondent;
- i) he sends the sign + twice, then " letters ";
- j) he gives the clearing signal.

§ 14. The called subscriber answers, if present, as soon as he receives notification of the end of the transmission (+ ?), in the following manner : he transmits the signal " R ", followed by the number of messages received.

§ 15. During an exchange of messages, the following rules must be observed :

- a) before each transmission, the signal " letters " must be sent;
- b) to interrupt the correspondent, transmit the letter P or the figure O until the correspondent stops sending;
- c) to invite the correspondent to transmit, signal + ?, followed by the signal " letters ";
- d) to ask him to wait, transmit the combination : " MOM ".

§ 16. If during a transmission there has been a pause of more than 30 seconds, transmission is resumed by the signal " letters " and then 2 seconds are allowed to elapse before continuing.

§ 17. If for any reason it is necessary to send a test message over an international circuit, one of the two following texts should be used :

VOYEZ LE BRICK GÉANT QUE J'EXAMINE PRÈS DU WHARF.
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG.

Annex No. 2

Use of emergency routes

When emergency telex routes are used, except in cases of arrangements to the contrary between the administrations (and/or recognized private operating agencies) concerned, the following provisions shall be applied :

1. The total charges for the telex communications exchanged by the emergency telex routes shall be the same as those applicable by the normal routes.

2. As a measure of reciprocity, the use of the emergency routes shall be admitted free of charge by the administrations (and/or recognized private operating agencies) concerned when the number of chargeable minutes of telex communications in one operating direction of one and the same international relation does not exceed 150 minutes per month.

3. When the total traffic exchanged by the emergency route in the direction considered exceeds 150 minutes per month, the following provisions shall be adopted :

- a) the use of the emergency routes shall be free of charge for the traffic passed in the direction in which the total number of chargeable minutes is less than or equal to 150 minutes;
- b) the charge for these communications (with a total less than or equal to 150 minutes) shall be apportioned in the normal way between the countries of the normal route;

- c) above 150 minutes, the total of the normal route (between the first rate areas of the terminal countries) shall be apportioned equally between the various administrations (and/or recognized private operating agencies) concerned, i.e. these administrations (and/or recognized private operating agencies) shall receive an equal share, whatever may be the nature and the length of the telex circuits used.
- d) to permit the application of this procedure when an international telex transit exchange is involved, the operator of the latter exchange must advise the operator of the controlling telex exchange of the emergency route used.

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Provisional Recommendation No. XI/2 (862). Use of a telex start-stop apparatus for the preparation of perforated tape etc.

The C. C. I. T.,

considering

the advantages offered to the subscriber by the use, outside communication periods, of the start-stop apparatus for the preparation of perforated tape, local checking of the tape, staff practice etc.,

declares the view

that for the installations of subscribers who request such facilities the provisions of article 24, § 6, sub-paragraph 1 a) of Recommendation No. 861 shall be maintained, excepting that the taking of the answer-back may be delayed by a period not exceeding 3 seconds.

Provisional Recommendation No. XI/3 (863). Prohibition of interruption of an established telex call

The C. C. I. T.,

considering

that inconvenience would be caused in the international telex service if a telex operator were permitted to break into an established telex call in order to announce another call,

declares the view

1. that an operator of a telex position may not, in any circumstances, interrupt, or cause to be interrupted, an established telex call;

and considering

that such a prohibition on interruptions could be a hindrance to the good working of the international telex service should a called subscriber's line be found to be engaged too frequently,

declares the view

2. that administrations could usefully insert in their subscriber's agreements a clause reserving them the right to require a busy subscriber to rent an additional line when, in the opinion of the administration concerned this course is warranted.

Provisional Recommendation No. XI/4 (864). Use of tape-teleprinters in the telex service

The C. C. I. T.,

considering

that the administrations are not unanimously of the opinion that the use of page-printers in the telex service should be made obligatory;

that in these circumstances it is necessary to define the characteristics of tape-printers used in the telex service to permit their satisfactory interconnection with page-printing teleprinters;

that the existence of different operating procedures for page and tape-printers would be highly undesirable,

declares the view

1. that administrations deciding to authorize the use of tape-printers in the telex service should make the necessary technical arrangements for their satisfactory interworking with page-printers;

2. that such administrations should also issue special instructions to the users of tape-machines to insure absolute adherence to the page operating procedure;

3. that tape-printers connected with the telex service should therefore be provided with the following features :

a) end of line indicator (character counter);

b) keys permitting the transmission of " Carriage return " and " Line feed " signals;

c) confirmation of the receipt of the " Carriage return " and " Line feed " signals by printing the symbols agreed in Recommendation No. 655;

4. that as a result of the use of a uniform operating procedure throughout the telex service, special directory markings to indicate users of tape-machines are unnecessary.

**Provisional Recommendation No. VIII/2 (869). Standardization of dials
for international telex positions**

The C. C. I. T.,

considering

1. that where dials are used for the process of automatic selection of subscribers to the International Telex network, it is advantageous to standardize as far as possible the characteristics of such dials;

2. that examination has shown that the range of impulse ratio at present in use is so great as to preclude standardization, at least at the present stage of development;

3. that the standardization of the dialling speed and the lost motion period presents no technical difficulty,

declares the view

1. that in the International Telex service, where dials are used for the automatic selection of subscribers

a) the dialling speed shall be standardized at 10 impulses per second, with a tolerance of plus/minus ten per cent;

b) the lost motion period of the dial shall be not less than 200 mS nominal value;

2. that it is desirable to continue the study relative to the standardization of the dial impulse ratio.

Provisional Recommendation No. X/1 (875). Structure of the Telegraph Regulations and classification of telegrams

The C. C. I. T.,

having considered the questions contained in Resolution No. 7 annexed to the International Telegraph Regulations, Paris, 1949,

expresses the opinion

1. that although proposals Nos. 567 and 919 presented by Portugal at the Paris Conference contain some interesting provisions, they cannot be maintained at present because :

- a) some of these provisions (limitation to three categories or classes) were in practice adopted by the Paris Conference;
- b) it would be premature to consider revision of the Paris Regulations after only a few months of application;

2. that the proposal of Czechoslovakia for deleting the signals of the Hughes and Siemens instruments from the Telegraph Regulations should be maintained;

3. that the proposal of the General Secretariat of the Union to modify the structure of Chapters V and VI of the Telegraph Regulations, Paris 1949, should be maintained in the amended form shown in Annex 1 to this Recommendation;

4. that it is possible, in the form shown in Annex 2 to this Recommendation, to approve the modification of the structure of Chapter XXII of the Telegraph Regulations, Paris 1949, as suggested in :

- a) Proposal No. 307 of Belgium submitted at the Paris Conference;
- b) the new proposals presented to Study Group X by the delegates of Sweden and Switzerland,

requests

the Secretary General of the Union to bear paragraphs 2, 3 and 4 above in mind when he asks Administrations to forward their proposals for the next International Telegraph and Telephone Conference to be held in 1954.

Annex No. 1 *

Proposal for the rearrangement of the provisions of Chapters V and VI of the Telegraph Regulations (Paris Revision, 1949)

<i>Classification proposed</i>	<i>References to provisions of the Paris Regulations</i>	<i>Version proposed</i>
1	2	3

CHAPTER V

Preparation and Handing — in of Telegrams

Article 8

Various parts of a telegram

§ 1	Art. 13	Without change.
§ 2	Art. 16, § 2 (completed)	§ 2. Telegrams which contain only an address shall not be admitted, whether or not this is preceded by one or more paid service indications.

* The cross-references in the texts below relate to the present annex and not to the Paris Telegraph Regulations.

<i>Classification proposed</i>	<i>References to provisions of the Paris Regulations</i>	<i>Version proposed</i>
1	2	3


Article 9

Wording of telegrams

§ 1. (1)	Art. 12, § 1 (completed)	§ 1. (1) The original telegram must be written in characters which are used in the country of origin and are taken from the table of telegraph signals (Article 10, § 1).
§ 1. (2)	Art. 12, § 3	(2) Every footnote, insertion, erasure, elimination or correction must be approved by the sender or his representative.
§ 2. (1)	Art. 18, § 8 (1)	§ 2. (1) Combinations or alterations of plain language words contrary to the usage of the language to which they belong shall not be allowed in plain language telegrams.
§ 2. (2)	Art. 18, § 8 (2) Art. 20, § 2 and Art. 21, § 2 in part (combined)	(2) Nevertheless, family names belonging to one person, names of telegraph offices and of land and mobile stations as defined in Article 12, § 12 and Article 16, § 1, names of towns, countries and territorial subdivisions, the full or abbreviated names of places, squares, boulevards, streets and other public ways, names of ships, designations of aircraft, and railway trains, and similar designations, compound words which can be justified if required, whole numbers, fractions, decimal or fractional numbers, written in words, may be grouped as a single word which shall be counted in accordance with Article 17, § 1.
§ 2. (3)	Art. 18, § 8 (3)	(3) Sub-paragraph (2) above shall likewise apply to numbers written in letters in which the figures are represented separately or in groups, for example : Thirtythree instead of threethousand-thirty or sixfoursix instead of sixhundred and fortysix.

Article 10

Characters which may be used

§ 1.	Art. 12, § 1	1. The following characters may be used in the wording of telegrams : (the remainder without change)
§ 2.	Art. 12, § 2.	No change.
§ 3.	Art. 12, § 5.	No change.
§ 4.	Art. 12, § 4.	Combination of sub-paragraphs (1) and (2).
§ 5.	Art. 12, § 6.	No change.
§ 6. (1)	Art. 12, § 7 (1)	(1) For expressions such as 30 ^a , 30 ^{ne} , 1°, 2°,  , 1' (minute), 1" (second), etc., which cannot be reproduced by instruments, the sender must substitute... (the remainder without change)
§ 6. (2)	Art. 12, § 7 (2) }	No change.
§ 6. (3)	Art. 12, § 7 (3) }	

<i>Classification proposed</i>	<i>References to provisions of the Paris Regulations</i>
<i>1</i>	<i>2</i>

Version proposed

3

Article 11

Forms of paid service indications

§ 1.	Art. 14, § 1	No change.
§ 2.	Art. 14, § 5 (amended)	Paid service indications may be written in any form, but they shall be transmitted only in the abbreviated form prescribed in paragraph 1 above. If necessary, the counter officer shall strike out the indication written by the sender and replace it by the abbreviated form prescribed for transmission, preceded and followed by double hyphens (example = TC =).
§ 3.	Art. 14, § 2	No change.
§ 5.	Art. 14, § 3	} No change.
§ 4.	Art. 14, § 4	

Article 12

Wording of the address

§ 1.	Art. 15, § 1	} No change.
§ 2.	Art. 15, § 2	
§ 3. (1)	Art. 15, § 4	
§ 3. (2)	Art. 15, § 3	
§ 4.	Art. 15, § 5	
§ 5.	Art. 15, § 6	
§ 6.	Art. 15, § 7	
§ 7.	Art. 15, § 8	
§ 8.	Art. 15, § 9	
§ 9.	Art. 15, § 10	
§ 10.	Art. 15, § 11	
§ 11.	Art. 15, § 12	
§ 12.	Art. 15, § 13	
§ 13.	Art. 15, § 14	
§ 14.	Art. 15, § 15	

Article 13

Wording of the text

Plain language and secret language

§ 1.	Art. 16, § 1	} Deleted.
	Art. 9, § 1	
a) plain language		} No change.
§ 2.	Art. 10, § 1	
§ 3.	Art. 10, § 2	
§ 4.	Art. 10, § 3	
§ 5.	Art. 10, § 4	
§ 6.	Art. 9, § 2	
		§ 6. All Administrations and recognized private operating agencies shall accept, in all their relations, telegrams in plain language.

<i>Classification proposed</i>	<i>References to provisions of the Paris Regulations</i>	<i>Version proposed</i>
<i>1</i>	<i>2</i>	<i>3</i>

b) secret language

§ 7.	Art. 11, § 1
§ 8.	Art. 11, § 2
§ 9.	Art. 11, § 3
§ 10.	Art. 11, § 4
§ 11.	Art. 11, § 5
§ 12.	Art. 11, § 6
§ 13.	Art. 9, § 3
§ 14.	Art. 9, § 2 (second sentence)

No change.

§ 14. Administrations may refuse to accept and to deliver private telegrams wholly or partly in secret language, but they must allow these telegrams to pass in transit, except in the case of suspension defined in Article 30 of the Convention.

Article 14

Wording of the signature. Legal verification

Art. 17 No change.

CHAPTER VI

Counting of Words

Article 15

Rules applicable to all parts of a telegram

§ 1.	Art. 18, § 1
§ 2.	Art. 18, § 2
§ 3.	Art. 18, § 5
§ 4.	Art. 18, § 6
§ 5.	Art. 18, § 7
§ 6.	Art. 18, § 4
§ 7.	Art. 18, § 9)

No change.

3. The following shall be counted as one word in all languages :
a) each of the forms prescribed for the transmission of paid service indications (Article 11, § 1).
sub-paragraphs b) to f) without change.

No change.

Article 16

Counting of words in the address

Art. 19 No change.

Article 17

Counting of words in the text

§ 1.	Art. 20, § 1	No change.
	Art. 20, § 2	Deleted: see Article 9, § 2 (2).

<i>Classification proposed</i>	<i>References to provisions of the Paris Regulations</i>	<i>Version proposed</i>
1	2	3

Article 18

Counting of words in the signature

- | | | |
|------|--------------|--|
| § 1. | Art. 21, § 1 | No change. |
| | Art. 21, § 2 | <i>Deleted</i> : see Article 9, § 2 (2). |
| § 2. | Art. 18, § 3 | § 2. The verification of the signature, as transmitted, shall be included in the number of chargeable words on the basis of fifteen characters per word. |

Article 19

Indication of the number of words in the preamble

- | | |
|---------|------------|
| Art. 22 | No change. |
|---------|------------|

Article 20

Irregularity in the counting of words**Correction of errors**

- | | |
|---------|------------|
| Art. 23 | No change. |
|---------|------------|

Article 21

Examples of counting of words

- | | |
|---------|------------|
| Art. 24 | No change. |
|---------|------------|

Annex No. 2**Proposal for the revision of the provisions of Chapter XXII
of the Telegraph Regulations (Paris Revision, 1949)****CHAPTER XXII****Press telegrams****Article 75****General remarks**

1. Press telegrams are telegrams the text of which is made up of information and news for publication in newspapers and other periodical publications or for radio broadcasting. They shall enjoy a special reduced rate.

2. (1) Press telegrams shall bear, at the beginning of the address, the paid service indication = Presse =, written by the sender.

(875)

(2) In press telegrams (699) at the reduced rate.

3. Administrations and recognized private operating agencies which do not admit press telegrams (either ordinary or urgent) must accept them in transit, subject to Article 76 *bis*, § 5.

4. (1) Press telegrams may be addressed only to newspapers or periodical publications, to government or private news agencies or bureaus, or to authorized radio broadcasting companies or stations, and only in their name, and not in the name of a person connected in any capacity whatever with any of such entities.

(2) In multiple press telegrams, all the addresses must fulfil the conditions of this Article.

(3) The use of registered addresses shall be authorized.

(4) Administrations and recognized private operating agencies (696) press rates.

Article 75 *bis*

Conditions of Admission

1. (1) Press telegrams must not contain any passage, advertisement, or communication (714) free of charge. They may contain only material for publication or broadcasting.

(2) However, instructions relative to the publication or broadcasting of the telegram shall be admitted, provided that such instructions are placed between brackets (for which a charge shall be paid) at the beginning or at the end of the text. The number of words thus added to the text properly so called (excluding the brackets) shall not exceed 10 per cent of the total number of chargeable words in the text, and shall not exceed 20.

2. (1) Stock exchange (715) press telegrams.

(2) In case of doubt (716) to establish the fact.

Article 76

Languages admitted

1. (1) Press telegrams must be expressed (707-711) of the country to which they belong.

(2) The sender (712) in this language.

2. The languages mentioned (713) in which the telegram is expressed.

Article 76 *bis*

Tariff and charging

1. The terminal and transit rates (701) in other relations.

2. The charge per word (702) over the same route.

3. The minimum number of chargeable (703) at ten.

4. The copying fee (704) multiple telegrams.

5. The transit rate which the administrations and recognized private operating agencies referred to in Article 75, § 5., receive, shall be that which results from the application of the provisions of §§ 1. and 2. above, according to whether ordinary or urgent press telegrams are concerned (706).

Article 77

Application of the normal tariff

(No change.)

Article 78

Transmission and delivery of press telegrams

(No change).

Article 79

Miscellaneous Provisions

1. With respect to any matter (724) operating agencies.
 2. The provisions (725) concerned.
-

**** Recommendation No. 876. Structure of the International Telegraph Regulations**

(Has become obsolete since Paris Conference 1949)

**** Recommendation No. 877. Acceptance of the International Telegraph Regulations**

(Has become obsolete)

**** Recommendation No. 881. European Phototelegraph Service Regulations**

(The European Phototelegraph Service Regulations appear in the Telegraph Regulations)

Recommendation No. 891. Method of operation between fixed stations

The C. C. I. T.,

considering

that the draft amendments to the provisions of the Telegraph Regulations relating to fixed services which were submitted by Mr. Caenepenne, member of the C. C. I. T., in pursuance to the recommendation of the Telegraph Regulations Committee of the Cairo Conference (see documents of the Conference: Vol. I, pages 472 and 473, and Vol. II, page 609) have not, owing to events, been subjected to critical examination, and that the question cannot consequently be regarded as sufficiently studied,

unanimously declares the view

that consideration of the question should be referred to one of the Study Groups to be set up with a view to the VIIIth Meeting of the C. C. I. T.

**** Recommendation No. 902. Unification of dates**

(Has become obsolete since Paris Conference 1949)

Provisional Recommendation No. X/2 (903). New tariff systems

The C. C. I. T.,

having considered the proposals submitted at the International Telegraph and Telephone Conference of Paris, 1949, by the Administrations of Portugal and Denmark on the setting up of new tariff systems contemplated in Resolution No. 10 annexed to the Telegraph Regulations, Paris, 1949,

(903)

considering

that administrations are as yet unable to assess the financial consequences of the important modifications made by the International Telegraph Conference of Paris, 1949, in the tariffs and the rules for word counting in the extra-European system which have been in force since 1 July 1950;

that sufficient information on this subject can only be obtained when these rules have been applied for some time and when international telegraph traffic is more stable;

that in these circumstances it is not at present advisable to study new tariff systems,

declares the view

that the proposals of Portugal and Denmark should not be considered at present;

that, however, the proposal of Denmark might be studied with respect to its application to the European system, if the Danish Administration so desired.

**** Recommendation No. 921. Establishment and collection of telegraph rates**

(Has become obsolete since Paris Conference 1949)

*** Provisional Recommendation No. XI/8 (951). Leasing of telegraph circuits**

(New text according to Provisional Recommendation No. XI/8)

The C. C. I. T.,

having examined Resolution No. 9 annexed to the International Telegraph Regulations, Paris, 1949,

considering

that it is desirable to make Regulations for lease of lines worked by start-stop apparatus,

declares the view

that the stipulations of Recommendation No. 951 of Brussels and Resolution No. 9 should be replaced by the following text :

I

Lease of telegraph circuits (European system)

- § 1. In relations of the European system where, after the requirements of the public telegraph service and of the telex service have been satisfied, telegraph circuits are available, such circuits may be leased to one or more users on the following terms.
- § 2. a) As a general rule, it shall be assumed that the circuit leased will be available throughout the 24 hours.
b) However, it shall be for administrations and/or recognized private operating agencies to decide whether in certain cases a lease may be for a shorter period. The rental and conditions will then be fixed by agreement between the administrations and/or recognized private operating agencies concerned.
- § 3. (1) A lease is considered as *single* when there is only one user at each end of the circuit. A lease is considered as *multiple* when there is more than one user at either or both ends of the circuit.

(2) A circuit may be leased jointly by two or more users ("multiple") only when these users are *directly* engaged in the same or correlated type of undertaking.

(3) The correspondence passed over leased circuits must concern only the undertaking or undertakings for which the circuit (s) has (have) been leased.

§ 4. (1) A user shall be considered as any undertaking that transmits and/or receives messages over a leased circuit.

(2) If an undertaking has several operating stations connected to the same end of the circuit, this undertaking shall be considered as a single user only.

§ 5. If correspondence transmitted over a leased circuit is transferred to another circuit ("single" or "multiple") leased by one or more other users, whether by retransmission or by switching, the rental for both circuits shall be considered as "multiple".

§ 6. An international leased circuit crossing a transit country shall be charged for as one circuit if no intermediate station is installed in the transit country. If, however, a user is connected to the circuit in the transit country, the circuit shall be divided for charging purposes into two sections which shall be charged for independently.

§ 7. The monthly rental for a single lease shall be calculated as follows, U being the unit telex charge ¹⁾ in the relation considered :

$$25 \times 80 \times U$$

§ 8. For a multiple lease the monthly rental shall be

$$25 \times 110 \times U,$$

U being the unit telex charge ¹⁾ in the relation considered.

§ 9. a) The rental conditions laid down above shall be applicable to circuits operated by start-stop apparatus fulfilling the provisions of the Telegraph Regulations and the recommendations of the C. C. I. T.

b) The lease of circuits worked by other apparatus or by start-stop apparatus not fulfilling the provisions under a), shall be subject to special agreement between Administrations and/or recognised private operating agencies.

§ 10. The lease shall be on a monthly basis with a minimum period of one month; the lease may be renewed monthly by tacit consent and may be terminated by either party giving one month's notice. The rental shall be payable monthly or quarterly in advance. One user sharing in a lease may be accepted by an administration or recognised private operating agency as the party responsible for the payment of the rentals due to it from all the users sharing in the lease of the circuit.

§ 11. The total receipts from the rental for a circuit shall normally be divided among the Administrations and/or recognised private operating agencies concerned in proportion to their shares of the rates for the telex service ¹⁾.

§ 12. The Administrations and/or recognised private operating agencies reserve to themselves the undisputed right to resume possession of the leased circuit if required in the general interest.

§ 13. In case of interruption of a circuit and at the request of the parties concerned, the Administrations and/or recognised private operating agencies may make repayment. The sum to be repaid shall be equal to the number of days during which the interruption has occurred multiplied by one twentyfifth of the fixed rental per month. No repayment shall be made for interruption lasting less than twenty-four hours; however, the interval between 9 a. m. and 3 p. m. may count in such cases as twenty-four hours. Repayment shall not exceed, for one month, the rental for that month.

II

Lease of telegraph circuits (extra-European system)

In the extra-European system, administrations and/or recognized private operating agencies shall determine, by means of special agreements, the conditions under which circuits should be leased.

¹⁾ Regulations for the subscribers' telegraph service by start-stop apparatus in the European system (Recommendation No. 861.) (Revised, art. 9 — No. 15.)

" 15. Unit charge in a particular international Telex service :

Charge for an ordinary three-minute telex call during periods when no tariff reductions are operative. "

In relations in which the telex service has not yet been introduced, the Telex unit charge shall correspond to half the telephone unit charge.

**Provisional Recommendation No. VII/3 (952). Metering of traffic
on leased telegraph circuits**

Resolution No. 9 (Part 1) — Paris Conference 1949

Draft Recommendation No. 3

The C. C. I. T.,

considering

1. that the requirement is a system of metering based on transmission time, and that such metering shall be effected by recording the time of transmission in both directions on the circuit, in fractions of 10 seconds (or six seconds), whether transmission is by duplex or simplex;
2. that the technical design of a device for metering on the lines stated in 1. presents no difficulties;
3. that the standardization of the detail of such a device is unnecessary and may be, because of circuit detail variations in different countries, undesirable;
4. that it is, however, essential that the performance limits of such a device should be standardized,

declares the view

that metering equipment, where used, shall conform to the following provisions :

1. that the metering device shall become operative as soon as transmission begins in either direction of the circuit;
2. that the meter shall register once per unit time period during which signals have been transmitted;
3. that the unit time period shall be ten (or six) seconds;
4. that the device becomes inoperative at the end of the last unit scanning period in which a transmission signal was received;
5. that the device shall be inoperative to any prolonged interruption of the circuit.

Annex

By way of example, designs of metering equipment developed by the Netherlands and United Kingdom Administrations, are given below, together with brief circuit details :

Diagram of Netherlands Equipment — Fig. 1

Brief Circuit Operation :

By means of the polarized relays T1 and T2 it is possible to read on both transmission paths. If messages are transmitted on one transmission path or on both paths, the A relay is energized as soon as the impulse

contact i is closed. The A relay remains energized via the a1 contact until the impulse of the central impulse device is finished. Via the a2 contact the meter M is energized. The a3 contact delays the release of the A relay in order to ensure that the meter M gets an impulse of sufficient length, if the A relay is energized just towards the finish of an impulse. The supervising relays S1 and S2 prevent metering if for some length of time 'start' polarity is on the line, which may be the case with breakdowns or clearing signal.

Diagram of UK equipment — Fig. 2

Brief Circuit Operation :

Relay M with its associated resistor and capacitor is designed to have a release lag of approximately 300 mS and to hold to telegraph signals. Also the release lag of relay B is required to be less than the operate lag of relay G.

Telegraph signals are detected on either or both lines by the polarized relay A. The contact A1 normally rests on the mark contact, so that relay M normally operated. At the first change from mark to space relay B operates via A1, G2 and P1 and holds over its second winding via B1, M1 and G3y. If, at any time, a long space signal releases relay M, the hold circuit for relay B is broken by M1.

When an earth pulse is received, relay P operates, and if relay B is held over its second winding P1 operates relay G via B2. Relay G locks via G1, prepares for the meter operation at G2 and releases relay B at G3y.

At the end of the earth pulse, relay P releases and earth is applied to operate the meter via P1 and G2 for a period equal to the release lag of the relay G.

Relay G releasing restores the circuit normal.

The Netherlands Administration has carried out tests to ascertain the probable error in the estimation of the transmission time, with the apparatus described above. It is clear that the timing pulses cannot, in general, be coincident with the commencement of traffic, or for that matter with the completion of traffic, and that there will be, because of this, some difference between the actual and measured times of traffic. It is to be expected that, with traffic of normal type, the difference would be small since the chance of shortening is equal to that of lengthening. This has been confirmed by the tests carried out by the Netherlands Administration.

The United Kingdom Administration prefers, for practical reasons, to use a 6 second pulse rather than a 10 second pulse. This also has the advantage that meter registrations can be read directly in minutes.

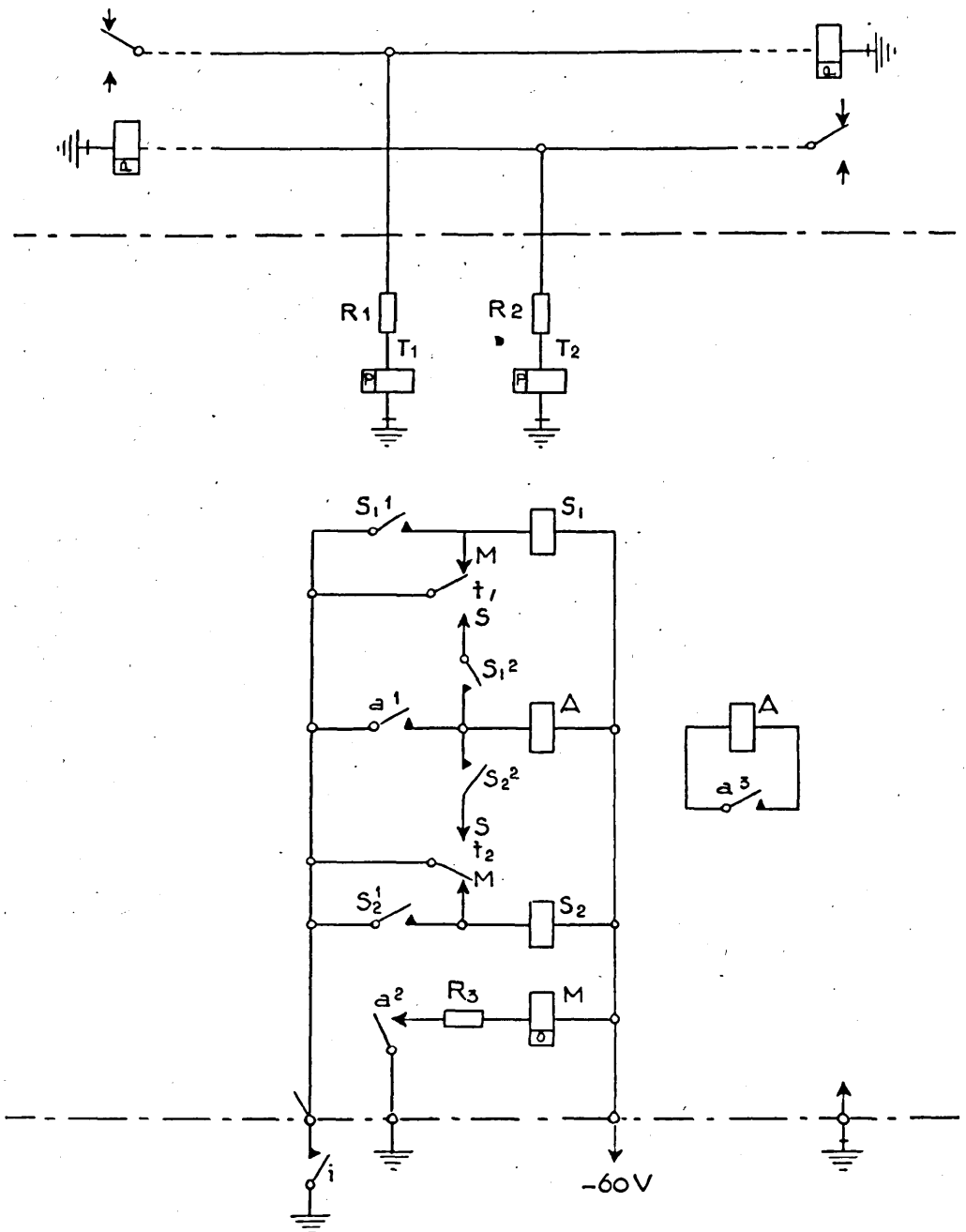


Fig. 1. — Traffic meter for rented telegraph circuits.

**Provisional Recommendation No. XI/6 (1953). Accounting of the rental
of the leases of international telegraph circuits**

The C. C. I. T.,

having examined paragraph 14. of Resolution No. 9-II of the International Telegraph Conference, Paris, 1949, and

considering

that it is desirable to adopt a uniform method of accounting for the rental for the lease of telegraph circuits in the European system,

declares the view

that each terminal administration should collect and retain its own share of rental for a circuit between adjacent countries;

that, when transit countries are involved, the terminal administrations agree with the transit Administrations as to the method and amount of collection and accounting.

**Provisional Recommendation No. X/4 (1961) issued by Study Group No. X of the C. C. I. T.
Messages routed over the international Aeronautical Fixed Telecommunication Network
(I. C. A. O.)**

The C. C. I. T.,

having examined the questions contained in Resolutions Nos. 8 and 11 annexed to the International Telegraph Regulations, Paris, 1949;

considering

that the international aeronautical messages essential to airline operating agencies for the economic working of their services (defined by ICAO as class B messages) are to be regarded as "private telegrams" in accordance with the definition of this term contained in Annex 2 to the International Telecommunications Convention;

that, in these circumstances, they should be forwarded over the public international telecommunication network;

but recognising

1. the necessity, in certain relations, for the specially rapid handling of class B messages for airline operating agencies;

2. that, moreover, the messages in question may originate at or may be addressed to localities poorly served or not reached at all by the public international telecommunication network,

is of opinion

1. that, in principle, aeronautical class B messages should be routed over the public telecommunication network;

2. that, however, in the cases envisaged under 1 and 2 in the preceding paragraph, the messages may be routed over the aeronautical network,

and in that eventuality,

considering that whichever network may be used, the airline operating agencies should pay for the service rendered,

recalls

that the Paris Conference 1949 considered that these rates should not contain any element of preference in relation to the rates for similar telegrams forwarded over the public telecommunication network, and that, so far as possible, they should be the same as these latter rates;

noting

that in accordance with the observations made by the representative of ICAO, that organisation has not yet settled its policy on the question of rates but is to study the question in the near future,

the Study Group is of the opinion

that the study of this matter must be pursued in collaboration with I. C. A. O.

**** Recommendation No. 981. Rates of the phototelegraph service**

(These rates have been inserted in the Telegraph Regulations)

Provisional Recommendation No. X/3 (1982) issued by Study Group X of the C. C. I. T.

Charges for Phototelegrams

The C. C. I. T.,

having considered

the First part of Resolution No. 16, relative to charges for phototelegrams, annexed to the Telegraph Regulations, Paris, 1949;

noting

that as regards rates for phototelegrams, it is presented with proposals, some of which are based, in accordance with the existing system, on telephone rates and one of which is based on telegraph rates;

that it will be necessary to have the views of Administrations and recognized private operating agencies on these proposals,

resolves

that these proposals shall be sent to the Administrations and recognized private operating agencies concerned for study, in the hope that they will furnish their remarks and suggestions;

that these remarks and suggestions shall be studied at a later meeting of the Study Group in order that proposals may be extracted from them for submission to the meeting of the Plenary Assembly of the C. C. I. T. planned for 1953;

draws the attention

of those Administrations and recognized private operating agencies to the Danish proposal to transfer to the Telephone Regulations all provisions relative to phototelegrams — a proposal which seems to clash with the definitions of telegraphy and telephony given in Annex 2 to the International Telecommunication Convention of Atlantic City (1947),

and asks

the Interim Director of the C. C. I. T. to take the appropriate action.

LIST OF QUESTIONS UNDER STUDY

at 15 August 1951

N. B. : Studies in connexion with which Study Groups have issued Class A Provisional Recommendations, or Class B Draft Recommendations which became Provisional as the result of a consultation of administrations, have been omitted in this List, except where the Study Group has declared the study in question to be unfinished.

Study Group I

Question III, 0 : It is possible to simplify and make clearer the definitions referring to apparatus and lines which appear in Recommendation No. 301 ?

Note : This question was made the subject of the following draft recommendation of Category C issued by Study Group No. 1.

Provisional Recommendation I/1 (category C) Fundamental definitions relating to telegraph transmission

(This Recommendation replaces Recommendation N° 301.)

The C. C. I. T.,

considering

that in the interests of the efficient operation and maintenance of telegraph circuits, it is desirable to clarify certain ideas and to standardize certain terms,

declares the view

that the following definitions should be adopted :

1. *Telegraph modulation and telegraph restitution.*

Telegraph modulation is the series of discrete conditions assumed successively by the appropriate moving part of a telegraph instrument (or by an electrical device performing a similar function) having a significance according to the code used, with the object of effecting on the appropriate receiving device a series of changes of condition permitting the reconstitution, according to the same code, of the message transmitted. This series of changes of condition is called a restitution of the telegraph modulation.

2. *Significant conditions (of a modulation or of a restitution).*

Discrete conditions assumed by the appropriate moving part of a telegraph instrument (or by an electrical device performing a similar function) used to define the modulation (or the restitution).

3. *Characteristic or significant instants (of a modulation or of a restitution).*

Instants at which the appropriate moving part of a telegraph instrument (or an electrical device performing a similar function) reaches its significant condition.

4. *Significant interval (of a modulation or of a restitution).*

The time which elapses between two successive characteristic (or significant) instants.

5. *Significant element (of a modulation or of a restitution).*

That part of a modulation (or of a restitution) occurring between two successive characteristic (or significant) instants.

6. *Unit interval.*

The modulations of the standardized telegraph systems are composed of significant elements having a duration equal to or a multiple of the duration of the shortest element.

The theoretical duration of this shortest element is called the unit interval. An exception to this rule occurs with start-stop systems for which the stop element may have a duration greater than the unit interval and not necessarily equal to a multiple of it.

7. *Unit element.*

Significant element having the duration of a unit interval.

8. *Modulation rate (or telegraph speed).*

Reciprocal of the duration of the unit interval, measured in seconds. The modulation rate (or telegraph speed) is measured in Bauds. Example : If the unit interval is 20 milliseconds, the modulation rate is 50 Bauds.

9. *Restitution delay.*

The delay between a characteristic or significant instant of modulation and the corresponding characteristic instant of restitution.

10. *Isochronous modulation.*

Modulation appropriate to a standardized system in which the significant intervals are equal to the unit interval or to a multiple of it.

11. *Start-stop (or arhythmic modulation).*

Modulation appropriate to a standardized system consisting of isochronous modulations having a duration limited to a certain number of unit intervals, separated by intervals of any duration equal to, or greater than, the unit interval.

12. *Perfect modulation or restitution.*

Modulation or restitution conforming accurately to the code adopted (as regards both the significant conditions and the characteristic instants).

13. *Distorted modulation or restitution (or modulation or restitution affected by distortion).*

Modulation (or restitution) not having all the characteristics of a perfect modulation (or restitution). For standardized modulations and their restitution, the series of conditions must be in accordance with the code, without omission or addition; this being understood, the distortion concerns only the characteristic instants.

14. *Degree of individual distortion of a particular characteristic instant (of modulation or of restitution).*

Ratio to the unit interval of the displacement, expressed algebraically (i. e. early or late), of this characteristic instant from a specified instant. It is necessary to state in each particular case the basis on which this specified instant is determined.

15. *The degree of distortion of an isochronous modulation (or restitution).*

Ratio to the unit interval of the maximum difference, irrespective of sign, between the actual and theoretical intervals separating any two characteristic instants of modulation (or of restitution), these instants being not necessarily consecutive.

16. *Degree of distortion of a start-stop (or arhythmic) modulation (or restitution).*

Ratio to the unit interval of the maximum difference irrespective of sign between the actual and theoretical intervals separating any characteristic instant of modulation (or of restitution) from the commencement of the start element immediately preceding it.

a) *Degree of gross start-stop (or arhythmic) distortion.*

Degree of distortion determined when the unit interval and the theoretical intervals assumed are those appropriate to the standardized modulation rate.

b) Degree of synchronous start-stop (or arhythmic) distortion.

Degree of distortion determined when the unit interval and the theoretical intervals assumed are those appropriate to the actual mean modulation rate of the signals under consideration.

17. Degree of service distortion (of a circuit, including apparatus).

Degree of distortion of the restitution measured during an unspecified period of time when the telegraph apparatus is in service. The result of this measurement may be completed by an indication of the probability of exceeding this degree of distortion.

18. Degree of standardized test distortion (of a telegraph channel).

Degree of distortion of the restitution measured during a specified period of time when the modulation is perfect and corresponds to a specific test.

19. Analysis of types of distortion.

It is useful, for certain applications, to distinguish :

a) Bias distortion.

Distortion suffered by a modulation (or a restitution) of which the characteristic instants corresponding to a particular change of condition are systematically advanced or retarded.

b) Inherent distortion.

Distortion suffered by a restitution when the modulation is perfect and when the receiving device is ideally perfect.

c) Characteristic distortion.

Distortion suffered by a restitution when the modulation is perfect, with the normal receiving device in correct adjustment, and in the absence of disturbances of any kind.

d) Fortuitous distortion.

Distortion resulting from disturbances affecting the circuit including apparatus.

Note by the Permanent Secretariat of the C. C. I. T. : Study Group No. 1 is still studying the text of this Draft Recommendation and considering the further treatment by the C. C. I. R. of C. C. I. R. Question No. 18.

C. C. I. R. Question No. 18 : Establishment of a general definition of telegraphic distortion, capable of being usefully applied to the case of radiotelegraphy.

(Joint Study by C. C. I. T. and C. C. I. R. — See C. C. I. R. Report No. 1 on this subject of 6th Plenary Assembly of C. C. I. R. (Doc. 597-C. C. I. R.-6th Plenary Assembly, 1951).

Geneva Question No. 18.

Study of amendments to be made to the texts of the C. C. I. T. Recommendations as a result of the new definitions contained in the new Recommendation 301 (draft Recommendation I/1).

Note by the permanent Secretariat of the C. C. I. T.

Study Group No. I has decided to classify Draft Recommendation I/1 in Category C (draft Recommendation the wording of which is still being discussed). Hence study of Geneva Question No. 18 has to be postponed until Study Group I presents the text of Recommendation No. I/1.

Question III, I b) : In the case of irregular distortion of fortuitous origin, the distribution of which is thought to be governed by a standard statistical law, it is not possible to attach an exact value to the maximum they may attain. How should the limits to be assigned to them for the purpose of ensuring satisfactory service be expressed ?

Note : Study Group I has issued the following statement on this question :

Study Group No. I of the C. C. I. T., considering that study to date has been insufficient to produce a practical method of assigning limits to irregular distortion and that, if study is to be continued, new apparatus will have to be designed, some of which will make it possible to reply to other questions set by the C. C. I. T.,

expresses the view :

1. that study should be continued and the question kept in its present form;
2. that it would be of advantage to enquire whether replies to the questions raised in the annex would constitute a useful contribution to the study.

Annex

In the theoretical consideration of methods of measurement of fortuitous distortion, it is convenient to attach a more fundamental significance to the term *distortion* than that given by the definitions of Recommendation No. 301. Fundamentally, the determination of the value of telegraph distortion consists in expressing the relative time displacement of two instants of modulation (or the error in the time interval between two instants of modulation) as a fraction of the unit interval. According to Recommendation No. 301, however, the distortion of a train of telegraph signals is the maximum value of the distortion as defined above. During any particular period of observation, the distortion can therefore have only one value.

In theoretical studies, however, it is convenient to speak of *the start-stop distortion of a particular instant of modulation* i. e. the distortion of that instant of modulation with respect to the commencement of the start unit of the same character. Or again, it may be convenient to speak of *Element distortion*, i. e. the error in the time interval between the beginning and end of a particular signal element, expressed as a fraction of the unit interval.

In the following paragraphs, the term "distortion", without qualification, will be assumed, in general to include distortion defined in these special ways, and also to include *Individual distortion* as defined in the revised version of Recommendation No. 301, proposed by the United Kingdom. "Distortion" will however, always mean the value which applies to particular instants of modulation. It is then possible to attach more precise meaning to the expressions "distribution of distortion" or "probability of exceeding a given value of distortion". Where "distorsion" in the sense of "maximum distortion", as defined in Recommendation No. 301, is intended, the word "maximum" will be included.

If the distribution of fortuitous distortion values occurring on a telegraph channel follows a normal error law, no definite value can be regarded as the absolute maximum, through the frequency of occurrence of values exceeding $x\%$ distortion decreases rapidly as the value of x increases.

In order to define an effective maximum of distortion, it seems necessary to decide on a frequency of occurrence which may be regarded as low enough to be negligible in practice. The value selected might lie between 1 in 10,000 and 1 in 100,000. If the distribution is truly normal, and means are available for measuring either the Root Mean Square value of distortion or the Average value of distortion irrespective of sign, it is possible to compute the value which will be exceeded with any desired probability (or frequency of occurrence) from the known shape of a normal distribution curve. It may be desirable to employ an instrument designed to measure either the Root Mean Square or the Average value of distortion, or it may even be possible to estimate the Root Mean Square or the Average value of distortion by visual observation of a distortion measuring set of conventional type, but in either case the measurement can be made in a short time.

In practice the distortion values on a single telegraph link will, in general, only approximate to a normal distribution. Due to the fact that the fortuitous distortion results from a finite number of causes, there may be an absolute maximum which is less than 100% and which is never exceeded. The departure from a normal distribution will be most marked at the higher values of distortion and lower values of probability, i. e. in the part of the distribution curve which is of greatest interest. Considerable error may, in consequence, result if the practical maximum is computed on the assumption of a normal distribution. It may be, however, that the absolute maximum value of distortion occurs with a frequency which is high enough to enable it to be determined readily from observation of a distortion set of conventional type for a relatively short period. Measurement of fortuitous distortion on telegraph links is of interest, however, mainly with the object of assessing the performance of a circuit consisting of a number of links connected in tandem.

Now assuming that at the telegraph speed concerned, the characteristic distortion of each of a number of links is small (tests have verified that the characteristic distortion of channels of the multi-channel voice frequency telegraph system used by the United Kingdom Administration is sufficiently small) it follows that :

- a) the Root Mean Square value of distortion occurring on the complete circuit is the square root mean of the sum of the squares of the Root Mean Square values of distortion occurring on the constituent links;
- b) the distortion values on the complete circuit will approximate to a normal distribution even though the distribution for the constituent links departs appreciably from normal, and will approach more closely to normal as the number of tandem-connected links increases.

If, therefore, it is possible to measure the Root Mean Square value of distortion on each of the tandem-connected links, the Root Mean Square value of the distortion on the complete circuit can readily be calculated. Since the distortion values for the complete circuit can be assumed to follow a normal distribution, with far greater confidence than in the case of a single link, the value of distortion which is exceeded with any specified probability (or frequency of occurrence) can then be calculated by multiplying the Root Mean Square value by the appropriate factor " *k* ".

Values of factor *k* for a normal distribution

<i>Probability</i>	<i>k</i>	<i>Probability</i>	<i>k</i>
10 ⁻¹	1.65	5 × 10 ⁻⁴	3.48
5 × 10 ⁻²	1.96	2 × 10 ⁻⁴	3.72
2 × 10 ⁻²	2.33	10 ⁻⁴	3.89
10 ⁻²	2.58	5 × 10 ⁻⁵	4.06
5 × 10 ⁻³	2.81	2 × 10 ⁻⁵	4.27
2 × 10 ⁻³	3.09	10 ⁻⁵	4.42
10 ⁻³	3.29		

If this method of determining the effective maximum of distortion were adopted it is doubtful whether the Root Mean Square value of the distortion (or even the Average value) could be estimated with sufficient accuracy by visual observation of a distortion measuring set of conventional type, and it would be desirable to use an instrument designed to give a direct indication of the desired value. It might be more convenient to design such an instrument to indicate the Average (irrespective of sign) rather than the Root Mean Square value of distortion. This might be an acceptable alternative, for the following reason. If the distortion of the individual link has a normal distribution, the ratio of the Root Mean Square value to the Average value is known (1.25). If the distortion has an approximately normal distribution at least over the range of higher probability values, the ratio will not be greatly affected. Even if the distribution is rectangular, i. e. if all values of distortion below a particular value are equally likely, and higher values do not occur at all, the ratio of Root Mean Square value to Average value is 1.15. Hence no large error would result if the Average value of the distortion of the link were measured and then multiplied by 1.25 to obtain the Root Mean Square value.

As an example of the application of this method, suppose that the average fortuitous distortion (irrespective of sign) on each of four links is 2 % and that it is desired to determine the value which will be exceeded with a probability of 1/20,000 on a circuit consisting of the four links connected in tandem. The estimated Root Mean Square distortion on each link is $1.25 \times 2 = 2.5$ %. The Root Mean Square distortion on the complete circuit will be $2.5 \times \sqrt{4} = 5$ %. For a normal distribution the value which is exceeded with a probability of 1/20 000 is 4 times the Root Mean Square value, which is 20 %.

Direct measurement, either on a single link or on a multi-link circuit, of the value of distortion which is exceeded with a probability of, say 1/10,000, cannot conveniently be made by means of distortion measuring sets of conventional type. If, for example, the measurement is made using, as test signal, 2 : 2 reversals at 50 bauds, the time required for the transmission of 10,000 instants of modulation is about 6 minutes. On the average, therefore, the value which it is desired to measure will be exceeded only once in 6 minutes. This is an inconveniently long period of time for continuous visual observation. Furthermore, if the value of probability chosen were 1/100,000, the period of observation would be 60 minutes. Some instrument is desirable which will automatically indicate the distribution of the distortion, and which can be left operating unattended for the requisite testing period.

The United Kingdom Administration has developed and used an instrument (intended primarily for radio telegraph circuits) which continuously monitors the incidence of distortion on a telegraph circuit carrying traffic. This instrument records the occurrence of a signal element having a duration which is less than a predetermined fraction of a unit interval. Thus if the distortion dial of the instrument is set at 25 %, the instrument records the number of signal elements having a duration less than 15 milliseconds. In order to determine the probability that the particular value of distortion will be exceeded, it is necessary to estimate the average rate of occurrence in traffic signals of elements having a nominal duration of one unit interval. If a number of instruments of this type were used, each set to a different value of distortion, it would be possible, by interpolation, to determine the value of distortion which was exceeded with any particular value of probability.

Summarising, it seems desirable to consider the following subsidiary questions :-

1. Is it agreed that the main object of devising a method of measuring fortuitous distortion on individual links is to enable the distortion of circuits consisting of several tandem-connected links to be forecast?
2. Apart from rare exceptions, is the distribution of the frequency of occurrence of values of distortion such that the effective maximum distortion on a multi-link circuit can be ascertained by calculation based on a knowledge either of the Average value or of the Root Mean Square value of the distortion on the separate links, and on the assumption that the distribution of the frequency of occurrence of values of distortion on the multi-link circuit is in accordance with the normal error law?
3. Is there a need for an instrument which will measure either the Root Mean Square value or the average value of distortion?
4. Is there a need for an instrument which will give the distribution of the frequency of occurrence of values of distortion on a circuit, or alternatively, which will indicate the value which is exceeded with a specified probability?
5. If the answer to 2 is affirmative, what value of probability (or frequency of occurrence) should be adopted when determining the effective maximum? What should be the permissible limit of effective maximum fortuitous distortion on a single telegraph link?

Note. — *The subsidiary question 1 has already been studied by Study Group No. 1 and answered in the affirmative.*

Question III, 2 : Study of the sensitivity of telegraph systems in respect of a non-transitory parasitic current.

1. Is it possible to establish a relation between this current and the distortion which it introduces in the telegraph system?
2. Is it possible to replace the relative limits, as fixed by the "Directives" in percentages, by absolute limits for the parasitic voltage or current?
3. Does the fixing of an absolute limit for the parasitic current also allow of fixing a service voltage limit for the power lines below which no interference can occur to the line in normal service on a single-wire telegraph communication?

Comments by Study Group No. 1.

S. G. I of the C. C. I. T. feels that a study of the sensitivity of telegraph systems in respect of non-transitory parasitic current is of interest only for communication by continuous current modulation on open wire lines (as envisaged in the body of the question), that such communication is being progressively abandoned by operating administrations and that the question overlaps with question III-6-b; the Group therefore proposes deleting question III-2.

Question III, 5 a : What is the factor which should characterize the quality of the balance of a duplex telegraph circuit, and what is the way to measure this factor? (See Recommendation No. 352.)

Question III, 5 b) : What is the quality of balance necessary in the case :

1. Of a circuit operated simultaneously in both directions ?
2. Of a circuit which, although duplexed for technical reasons (e. g., because of being connected to a switching network) is worked only one way at a time ?

Note by Study Group No. 1.

Question III, 5 a).

The Group decided to complete the text of Recommendation 352 as follows :

" Note : The quality of balance thus characterized is not applicable to telegraphy on long submarine cables."

The question should be cancelled.

Question III, 5-b).

It appeared that administrations were not interested in the question.

Since administrations themselves do not appear to be interested in the question set, and since it is difficult to give exact indications of the degree of balance necessary for the 2 cases cited in the question because parasitic currents arising from faulty balancing influence the level of interference, the Group proposes deleting question III, 5b).

Study Group No. II

Question III, 1 a) : Study of the influence of different sections (links) on the quality of transmission of a complete telegraph connection ? (See Recommendations 312 and Question Geneva No. 1).

Geneva Question No. 1. New Question to replace Avis No. 313.

In the study of the addition of different types of distortion :

for small values of distortion with symmetrical signals (1/1 and 2/2), does a law of algebraic addition correspond approximately to the results obtained ?

for distortion with dissymmetrical signals (1/6 and 6/1), does a law of algebraic or arithmetic addition correspond approximately to the results obtained ?

for fortuitous distortion does a law of quadratic addition correspond approximately to the results obtained ?

for rhythmic service distortion, and in the case in which the distortion on symmetrical signals has been previously reduced to a minimum by a suitable adjustment, can the results obtained be expressed by a law of addition of distortion lying between arithmetical and quadratic additions of the component values ?

Note : This question is bound up with Brussels Question III, lit. a).

Annex (Old Annex to Recommendation No. 313)

The conception of telegraph distortion is based on the consideration of the restitution delays, that is to say, of the time interval between each characteristic instant of the modulation emitted and the corresponding characteristic instant of the modulation received. It is known that the restitution delays depend partly on the way the modulation is composed, and partly on circumstances wholly independent of the modulation. If all restitution delays were equal, the modulation would be delayed uniformly by the transmission, but would not be deformed; in such a case one is justified in saying that there would be no distortion. Accordingly the value of the telegraph distortion has been defined as the ratio of the difference between the greatest and the smallest delay to the duration of the elementary interval taken as the time unit.

The purpose of the repetition of these well-known considerations is merely to draw attention to the fact that the conception of the value of distortion is concerned only with the extreme restitution delays, and is accordingly an overall conception. It is of course possible to distinguish two components in the value

of distortion, viz. (1) what has been called the "characteristic distortion", which depends solely on how the modulation is composed, and (2) what has been called the "fortuitous distortion", which is independent of the composition of the modulation.

The problems concerning the connection of transmission channels by joining the receiving relay of a first channel to the transmitting relay of a second channel have raised the question of how the value of distortion of a multi-link channel is related to the values of distortion of the constituent channels. Put in this form, it has been easy to see that there was no simple or precise answer to the question. It has been generally held that the addition of the fortuitous distortions of two channels connected in tandem followed the laws of chance—that is to say, that the resulting distortion was the square root of the sum of the squares of the constituent distortions. This appears plausible and reasonable, though difficult to prove. As to the law of addition of the characteristic distortions, no plausible theory has been put forward.

If, however, we come back to the fundamental conception, on which the definition of restitution delay is based, we may take it that the following proposition is self-evident and applicable in all cases, viz. that *the restitution delay for the composite channel is the sum of the restitution delays of the composing channels*. In actual fact the proposition is liable to a slight element of error from the fact that restitution delays are generally defined on the assumption that the transmitted modulation is perfect, whereas in cases of tandem connection of a number of channels the modulation emitted in the second channel, being that which comes from the first channel, is affected by a certain amount of distortion. It may, however, be assumed that the error thus involved is tolerable, and that the law of addition of the restitution delays of the composing channels holds good, at any rate as a first approximation.

We thus arrive at a possibility of defining the distortion in a form which permits of additions: it might for this reason be called *algebraic distortion*. The definition might be based on the following considerations:

1. Start with the assumption of a standard modulation, for example, the modulation defined by the state of repose lasting until an isolated transmission—which gives a very exact 'origin' from which to ascertain the characteristic instants of the modulations received.

2. In the case of any given modulation differing from the standard modulation, the characteristic instant of the modulation received will not in general be identical with the origin above defined: there will be a certain delay (as a rule positive, but it may also be negative) between the origin and the characteristic instant received. This delay is evidently the difference between the restitution delay for the given modulation and the restitution delay of the standard modulation. It may be helpful to call this delay the *modulation delay*.

3. If the modulation delay ascertained for a given channel and for each modulation is divided by the duration of the unit interval, the result is a number (positive or negative) which may be called the *algebraic distortion*.

4. Thus, for any given channel, the algebraic distortion is a function of the composition of the modulation. If we call the algebraic distortion ϕ , we note that it depends on the modulation under consideration, and call it accordingly ϕ_M .

5. The algebraic distortion thus defined is such that, if it is known in the case of each modulation on a number of channels put end to end, the algebraic distortion of the resulting channel is, at any rate a first approximation, the sum of the algebraic distortions of the composing channels.

6. The value of distortion, in accordance with the definition laid down by the C. C. I. T. in its previous discussions, has the following simple relation to the algebraic distortion—that is to say, for any given channel the rate of distortion is the difference between the greatest value and the smallest value of the algebraic distortion. Consequently, if M' and M'' represent the two modulations which give the greatest and the smallest algebraic distortion on the channel under consideration, we have:

$$\delta = \phi_{M'} - \phi_{M''}$$

The ideas submitted are not without analogy with the conceptions, which have long been in vogue in connection with the study of telephonic transmission where, in order to express the variation of attenuation with frequency, the practice of characterizing a line by its equivalent in miles of standard cable at 800 c/s was abandoned. But telephone engineers, in assessing the transmission phenomena, had a very clear parameter at their disposal, namely, the *frequency*, whereas telegraph engineers have not so far had any numerical parameter by which to characterize the transmission phenomena which for them means the modulation from its original commencement up to the characteristic instant under observation. We think, however,

it is now clear that, if we had at our disposal a numerical parameter for each of the possible modulation trains—the value of such a parameter being represented by m —the knowledge of the function $\varphi(m)$ in relation to a given channel would have the same advantages for telegraphy as the function attenuation-frequency has for telephony.

Accordingly, we have to define a parameter called *modulation index-number*, which will make it possible to characterize clearly and unambiguously any modulation up to the characteristic instant under consideration. (Only two position telegraph modulation is considered, though the proposed definition should be such as to admit of its extension to three position telegraph modulation.)

We know that each element of a modulation can be characterized by a number equal to -1 or $+1$ according as the element is a spacing or a marking transmission. A succession $a_n, a_{n-1}, \dots, a_h, \dots, a_0$ of $n+1$ numbers, of which some equal -1 and the others $+1$, is an unambiguous definition of a modulation composed of $n+1$ elements, disposed between the instant $-n$, representing the beginning of the element characterized as a_n , and the instant zero, representing the element characterized as a_0 . The index-number for this modulation is the quantity represented by:

$$m = \frac{a_n}{2^n} + \frac{a_{n-1}}{2^{n-1}} + \dots + \frac{a_h}{2^h} + \dots + \frac{a_1}{2} + a_0$$

It is easy to see that this number m meets our requirements inasmuch as it defines clearly and unambiguously any given completed modulation. It has the following easily recognized properties:

1. Two different number indices correspond to two different finite modulations (i. e. comprising a finite number of elements).
2. The number thus defined is included between -2 and $+2$ if one takes into account infinite modulations, i. e. modulations comprising an infinite number of elements before the element a_0 .
3. One, and only one, *infinite* modulation corresponds to any number between -2 and $+2$.
4. One, and only one, *finite* modulation corresponds to any fractional number between -2 and $+2$ whose denominator is a power of 2.
5. It is observed that an infinite modulation corresponds *likewise* to such a number.
6. An index number included between 0 and $+1$ corresponds to any modulation terminating at zero instant by an alternation from "rest" to "work" ($a_0 = +1, a_1 = -1$).
7. The knowledge of the algebraic distortion φ for all the modulations whose index number m lies between 0 and $+1$ defines a function $\varphi(m)$ which may be represented by a curve, which may play in telegraphy a role similar to the role of the frequency-loss curve in telephony and which might be called the *distortion-index* or *distortion-modulation* curve.

A particular study renders it possible to demonstrate certain theoretical properties of this curve, the practical interest of which may be considerable. We shall, however, confine ourselves to the description of these two new notions of algebraic distortion and of modulation index-number, notions of complementary interest which, in our opinion, should facilitate in particular the study of all the problems connected with telegraphic transmission over combined channels.

Geneva Question No. 2:

Should measurements of service distortion on telegraph channels using the standard text mentioned in Recommendation 311, be made with a rhythmic distortion meter or with a start-stop distortion meter?

Geneva Question No. 3:

a) What are the best conditions of observation (namely the nature of the modulation and the time and the duration of the test) which can be recommended for the measurement of signal distortion on an international telegraph circuit, in order to be sure that the measurement obtained gives a good indication of what the performance of the circuit will be during periods of normal traffic?

b) By how much is it necessary to increase the distortion measured according to the conditions defined above in order that the result thus obtained should be equal to the value of the maximum distortion which can appear during the periods of use of the circuit in normal traffic?

c) What is the probability that the distortion actually produced by the circuit exceeds the value measured according to the conditions already defined in a) ?

Question III, 3 a) : What are the conditions under which electromagnetic receiving relays can be replaced by purely electrical devices ?

Question III, 3 b) : What maximum transitory distortion can be tolerated on signals when the transmission equivalent of circuits carrying voice-frequency telegraph channels suddenly varies ?

Question III, 6 b) : What are the causes of disturbances to signals received on a channel of communication, and how do they individually contribute to the resulting distortion ?

(See provisional Recommendation No. 711-II/11.)

Question III, 6 c) :

1. What measures should be taken to ensure that breakdowns affecting communications between subscribers to the international telex service are repaired as quickly as possible ?
 2. What instructions should be given in such cases to international telex positions ?
 3. What provision should be made for a technical organization which would quickly take the necessary steps on calls in progress between subscribers, and what simple technical methods can be recommended for location of breakdowns ?
-

Note by the permanent Secretariat of the C. C. I. T.

The attached diagram gives the definitions of the various parts of a telegraph circuit, as prepared by Study Group II for its own purposes.

Geneva Question No. 4 :

What are the changes to be made in Recommendation No. 331 as a result of the proposals made by Provisional Recommendation 375 (II/9) ?

- a) for the trunk section of a telegraph channel, a limit of 28 % for the degree of rhythmic service on distortion standard text;
- b) at the input to the trunk section, a limit of 12 % for the gross start-stop distortion;
- c) a limit of 30 % for the degree of gross start-stop distortion which it should be possible to apply to the local section.

Note : *Study Group II will consider revision of paragraphs 3 and 4 of Recommendation No. 331.*

Geneva Question No. 5 :

What methods of measurement can be recommended for international teleprinter circuits with a view to checking that a reasonable factor of safety exists between :

- the degree of distortion of the received signals at the junction points of the various sections which make up the circuits, and
- the permissible limits quoted in Provisional Recommendation No. 375 (II/9) ?

Question III, 8 a) : What are the telegraph transmission standards which should be adopted for teleprinter switching network :

- a) between a user's station and an international Line-head Office ?
- b) between international Line-head Offices ?

(See Provisional Recommendations No. 375-II/9 and No. 520-II/8.)

Question III, 8 b) :

1. What requirements must be fulfilled by regenerative repeaters ?
2. Where and in what circumstances is it desirable to insert regenerative repeaters in international Telex circuits ?

Note : This question should be studied in relation to the question of the transmission of the 7 or 7 ½ unit code signals and of dialling impulses and clearing signals.

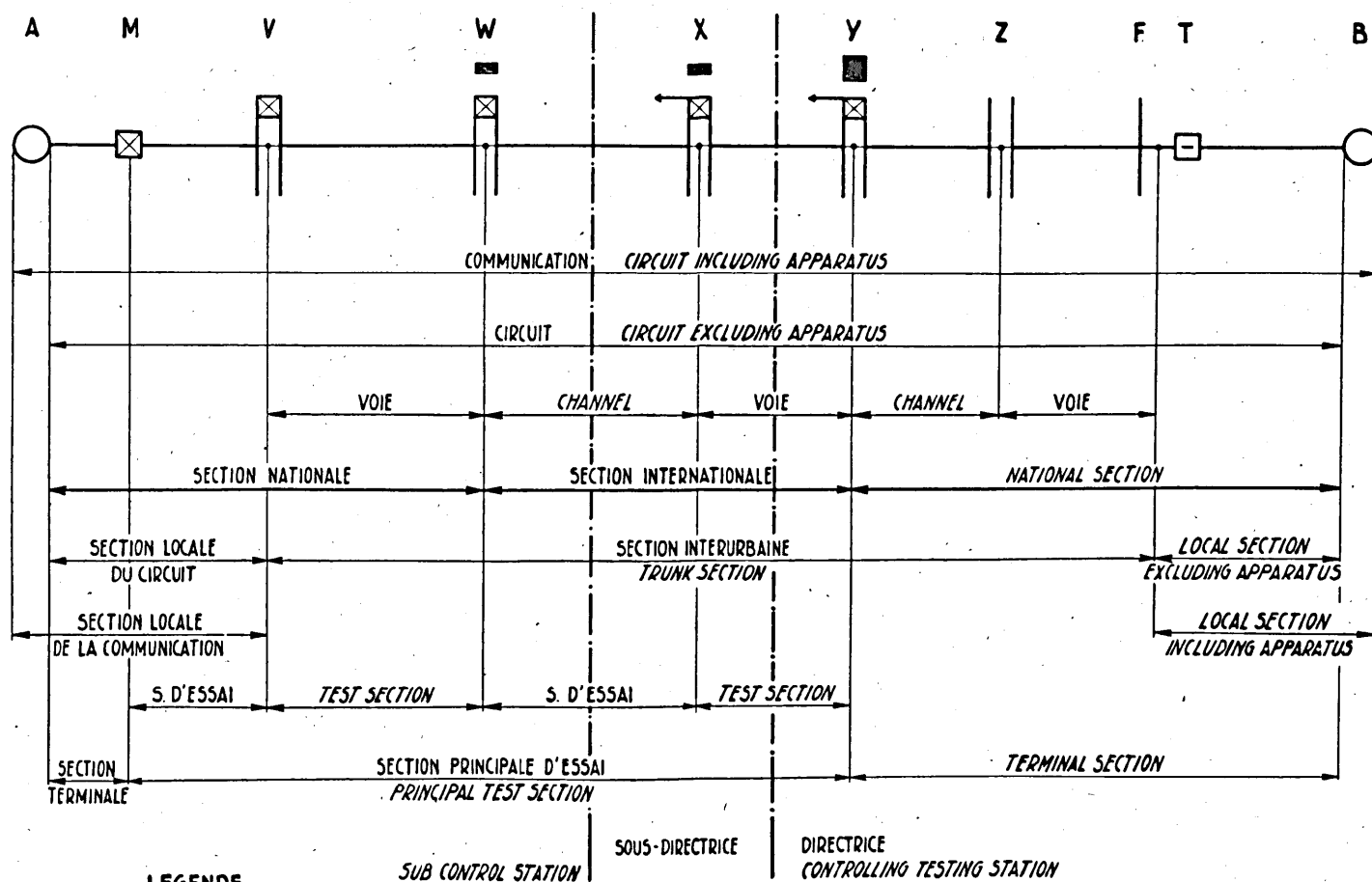
(See Provisional Recommendations 389-II/13, No. 102-II/19 and No. 552-III/1.)

Question V, 1 a) : Modern telephone channels with a band of 300 to 3400 c/s would easily permit the operation of 24 V. F. telegraph channels between (420—60) c/s and (3180+60) c/s; should the use of 24 such channels be made general on all such lines of transmission ?

Question V, 1 c) :

1. Are there any grounds for introducing, for international traffic, systems of V. F. telegraphy insensitive to great variations on level ?
2. If so, what requirements must be fulfilled by these systems ?

" NOTE.- DES COMMUTEURS PEUVENT EVENTUELLEMENT ETRE PLACES EN V, W, X, Y, Z ET ENTRE F ET T, ET, DANS CE CAS, LES EMPLACEMENTS DES STATIONS DIRECTRICES ET SOUS-DIRECTRICES PEUVENT ETRE MODIFIES "



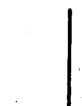
LEGENDE



{ APPAREIL TELEGRAPHIQUE
TELEGRAPH APPARATUS



{ STATION OU CENTRE POSSEDANT UN EQUIPEMENT
DE MESURES PERMETTANT DE FAIRE DES ESSAIS
DE TRANSMISSIONS TELEGRAPHIQUES
STATION OR CENTRE PROVIDED WITH TESTING
EQUIPMENT ENABLING IT TO CARRY OUT
TELEGRAPH TRANSMISSION MEASUREMENTS



{ EQUIPEMENT DE TELEGRAPHIE HARMONIQUE OU
DE TELEGRAPHIE SUR CABLE
V-F OR PHANTOM CIRCUIT INSTALLATION



{ FRONTIERE
FRONTIER



{ TRANSLATION TELEGRAPHIQUE
TELEGRAPH REPEATER



{ STATION DIRECTRICE
CONTROLLING TESTING STATION



{ STATION SOUS-DIRECTRICE
SUB CONTROL STATION



{ STATION DE CONTRÔLE DU FAISCEAU
SYSTEM CONTROL STATION

" DIAGRAMME DES DEFINITIONS PROVISOIRES INTERVENANT SUR UNE COMMUNICATION TELEGRAPHIQUE INTERNATIONALE POSTE A POSTE OU EN COMMUTATION "

" DIAGRAM OF PROVISIONAL DEFINITIONS OCCURRING IN AN INTERNATIONAL POINT-TO-POINT OR SWITCHED TELEGRAPH COMMUNICATION "

" NOTE. SWITCHES MAY BE PLACED AT V, W, X, Y AND Z, AND BETWEEN F AND T, AND IN THIS CASE, THE SITES OF THE CONTROLLING STATIONS AND SUB-CONTROLLING STATIONS MAY BE CHANGED "

Precisions on Brussels question V, 1c) by Study Group II

In the study of this Question particular regard should be paid to the following advantages of *frequency-modulated* systems as compared with amplitude-modulated systems :

1. Service distortion remains very moderate even when considerable variations in signal level occur.
2. Since the V. F. receiver does not require a time-constant level regulator the rate of change of signal level is unimportant in its effect on signal distortion. It appears very difficult to obtain this condition in amplitude modulated systems.
3. Theory seems to show, and the practical experience of certain Administrations confirms, that a frequency modulation system is better protected against noise.
4. Since a line frequency is always present, the line is easier to check and to maintain.
5. The system is directly adaptable to radio transmission.
6. It seems likely that when used in automatic switching networks frequency-modulated channels would cause fewer false calls.

In the design of A. M. and F. M. voice-frequency telegraphy systems insensitive to great variations in level, it is important to reduce

- a) the signal distortion caused by slow and abrupt changes of signal level and
- b) false calls in switching systems. _____

Geneva Question 6 :

1. Should voice frequency telegraph systems be used in international traffic which give low value transitory distortion for sudden variations of the equivalent of carrier circuits?
2. If so, what are the conditions which such systems should fulfil? _____

Geneva Question No. 7

What should be done to prevent disturbing signals, e. g. calling or clearing signals, reaching telegraph switching equipments, if there is a failure in the current controlling the sending static relays of voice-frequency telegraph equipment? _____

Geneva Question No. 8 (new text of old Question III, 8 d) :

1. What monitoring of signalling devices should be used for voice frequency telegraph systems, the channels of which are used for international switching circuits?
2. What frequency should be recommended for use on the special channel on which this monitoring and signalling would be carried out?
3. What special arrangements should be made for locating causes of false signals due to transitory changes in transmission level or transitory increases in noise level on voice frequency telegraph lines?
4. What standards of performance should be agreed with the C. C. I. F. with respect to these questions?

(See Provisional Recommendation No. 712-II/12.) _____

Geneva Question No. 9 :

At what level can text signals and 1/1 signals be transmitted synchronously over two voice-frequency telegraph channels having 240 c/s separation, without the receiving relay of the intermediate channel operating to the marking position, in the absence of the carrier frequency of that channel? _____

Geneva Question No. 10 :

What must be the characteristics of sending equipment, and of detectors in amplitude-modulated voice-frequency telegraph system insensitive to variations in level amounting to plus or minus 1 N, in order to eliminate false calling signals as far as possible?

Geneva Question No. 11 :

Study of the duration and amplitude of noises likely to operate voice-frequency telegraph receivers.

Question V, 1 e) : Is there reason to envisage one or two supplementary telegraph channels above or below the normal voice-frequency telegraph channels transmitted on a telephone circuit, in order to permit the controlling station, in case of trouble, to change over to the reserve telephone circuit, either manually or automatically, but without the co-operation of the other terminal station?

Question V, 1 f) : What are the essential characteristics to be imposed on carrier telephone channels (e. g. 12 channels systems on cables, open wire lines or coaxial systems) so that they may be utilized for V. F. telegraphy? (See Avis No. 518.)

Question V, 2 b) :

1. Is it necessary to envisage international communications permitting simultaneous communication by telephone and telegraph?
2. In the affirmative, what would be the characteristics of these communications?

Remark : On account of the effect upon the quality of the telephone transmission, the application of communication systems of the above type could only be envisaged on telephone circuits leased or under concession.

Question V, 6) : What are the conditions which should be imposed on V. F. telegraph plant employing double current technique used on modulated radio transmission channels?

(Question to be studied jointly with the C. C. I. R.)

Geneva Question No. 14 :

What are the changes to be made in Recommendation 335 as a result of the proposals of Provisional Recommendation No. 364 (II/6), in favour of recommending maintenance measurements only on the international section of a telegraph channel?

Study Group No. III

Geneva Question No. 15 :

What modifications need to be made to paragraphs 1 and 2 of Recommendation No. 331 as a result of Provisional Recommendation No. 375 (II/9)?

In the study of this question, it should also be considered, whether it is desirable to harmonize paragraphs 1 and 2 of Recommendation No. 331 with Recommendations Nos. 621 and 651.

(See question Geneva 4 allocated to Study Group No. II.)

Question VI, 4 a) : By what means would it be possible to extend the facilities provided by the International Alphabet No. 2? (See Recommendation No. 646 and question Geneva 17 allocated to Study Groups Nos. IX and XI.)

Remark : This study will have to take into account the needs of the Telex service, the public services and existing apparatus standardized according to the recommendations of the C. C. I. T. now in use. In particular, it will have to examine the possibilities offered by the use of signal 32.

It is held in abeyance until the completion of the study requested in Question Geneva 17.

Question VI, 4 b) : Study of the utilization of the "who are you" signal for the purpose of intercontinental co-operation of telegraph networks.

Question VI, 5 a) : Study of the intercontinental standardization of the modulation rate of start-stop apparatus.

Geneva Question No. 16 :

What special features need to be provided on Tape Teleprinters to enable Tape and Page Teleprinters to inter-work without difficulty?

Question VI, 7 : Standardization of certain characteristics of the paper used on start-stop apparatus. (See Recommendation No. 671.)

Question dealt with from Resolution No. 13 annexed to the Telegraph Regulations. Revised in Paris :

Should reperforators used in teleprinter operation be provided with a manually-operated tape feed-out mechanism? That mechanism would become inoperative if an incoming signal is received during its operation.

Study Group No. IV

Question V, 8 a) : Study of the transmission of half-tone pictures over combined radio and metallic circuits according to the advice of Recommendations Nos. 582, 583 and 584.

Question V, 8 b) : What amendments should be made in the directives contained in Recommendation No. 681 of the C. C. I. T. relating to the standardization of phototelegraph apparatus in order to make the most profitable use of the new wideband circuits standardized by the C. C. I. F., e. g. :

- a) by increasing the phototelegraph transmitting speed;
- b) by improving the definition;

- c) by increasing the number of channels available on the same circuit so as to allow of the simultaneous transmission of several pictures;
 - d) by having recourse to any other method deemed suitable.
- (See Provisional Recommendation 588 - IV/4.)
-

Question V, 8 c) : See Provisional Recommendation 584 (IV/3).

Question VI, 8 : Is there necessity to standardize internationally the characteristics of apparatus for the transmission of documents (photographs, pictures, text, sketches, etc.) with a method of reproduction not utilizing the normal photographic processes? If so, what should these characteristics be?

Comments by Study Group No. IV :

The IVth Study Group, in its study of Question VI 8), has reached the conclusion that, whilst this Question must remain for further study, it is desirable that it should be enlarged in scope, and to this end Study Group No. IV makes the following observations :

There is a need in some services (notably the meteorological service) to be able to transmit, in one operation, documents such as charts, etc., of a size too large for the largest drum at present recommended by the C. C. I. T. in its Recommendation No. 681.

Certain such services also wish to use photographic reproduction for reception.

Consequently,

1. The study should be continued with a view to standardizing drum dimensions, indices of cooperation, etc., permitting the transmission of such documents.
 2. The study should include both photographic and non-photographic methods of reception.
-

Study Group No. VI

Question II, 1 : Setting up of a *Glossary of Definitions* of terms used specially in studies concerning telecommunications (Recommendation No. 212).

(Question to be studied jointly with the C. C. I. F. and the C. C. I. R.)

Question II, 2 a) : Revision of the *List of Graphical Symbols* for telecommunications (Recommendation No. 226).

(Question to be studied jointly with the C. C. I. F. and the C. C. I. R.)

Question II, 2 b) : Setting up of a *List of Letter Symbols* for addition to the list already drawn up by the International Electro-technical Commission (Recommendation No. 221).

(Question to be studied jointly with the C. C. I. F. and the C. C. I. R.)

Question II, 4 : Possible recast of the *universal decimal classification* index where it concerns telegraphy and telecommunications in general (Recommendation No. 241).

(Question to be studied jointly with the C. C. I. F. and the C. C. I. R.)

Résolution No. 14 annexed to the Telegraph Regulations (Paris Revision) :

Study by the C. C. I. T. of the definitions

In conformity with the provisions of Article 8, paragraph 2, of the Convention, the International Telegraph and Telephone Conference, Paris, 1949, invites the C. C. I. T. :

1. To examine the definitions which appear in Annex 2 of the Convention with a view to ensuring that they are thoroughly adapted to the particular requirements of the international telegraph service.
2. To consider new definitions to meet the recognized needs of that service; and
3. To submit its conclusions to the International Telecommunication Conference of Buenos Aires in 1952.

Study Group No. VII

Question VI, 6 a) : Is further standardization of the signalling conditions for the telex service desirable and, if so, what should these standards be ?

Comments of Study Group No. VII.

Study Group VII has considered this question at the meeting at Geneva, March 1951, and has come to the conclusion :

1. That significant differences exist between the systems employed and projected in various countries for their internal telex networks.
 2. That the signalling arrangements to be used by an International Telex position for setting up a call to a subscriber connected to an automatic network in a distant country, is already determined in principle by the provisions of Article 22 of Recommendation 861.
 3. That it would be desirable to complete the provisions of Articles Nos. 23, 24 and 25 of Recommendation No. 861 which cover the signalling conditions to be employed between two or more manual International Telex Positions.
 4. That it would be of value for the signals employed on International Telex Circuits to be standardized as far as possible.
 5. That, however, it is not possible at the present time to establish further standardization of the signals employed in the telex service, and that, in consequence, the study of question VI 6 a) should be continued.
- During the further study of this question, special attention is drawn to the following signalling conditions :

a) *" Call Confirmation " Signal.*

This signal will inform the calling International Operator that the call has been duly received at the distant switching centre (manual, or automatic).

This signal is considered necessary in the case of International manual circuits to advise the calling operator that the circuit is functioning correctly, without awaiting the response from the called International Operator, who may not be available for some time after the receipt of the calling signal.

The " Call Confirmation " signal can be either of permanent " stop " polarity, or an impulse of " stop " polarity (e. g. 25 mS) followed by permanent " start " polarity.

In the former case, the return of permanent " stop " polarity should be delayed for a certain time so as to prevent the line from being permanently locked out of service due to the occurrence of " false calls " of short duration (a condition which may occur on both-way circuits).

b) *" Proceed to select " signal.*

(i) In the case of a call to be set up in a distant automatic network, this signal will advise the calling International operator that the distant switching equipment is ready for the reception of the selection signals (for example by dialling);

(ii) in the case of a manual circuit between two International Telex Positions this signal should be arranged to indicate that the called International Operator is ready to receive the particulars of the called subscriber (for example, that the called operator has connected his teleprinter at the distant end of the circuit).

The "Proceed to select" signal in this case is to a certain extent determined by the provisions of Article 25, para. 2 (b) of Recommendation 861, which states that the abbreviated name of the called exchange should be sent to the calling operator. However, the return of a line signalling condition, having characteristics which could be readily detected, and which could provide, for example, a lamp indication in the cord circuit of the calling operator, would perhaps be of interest. This signal can be given either by an impulse of "start" polarity (e. g. 100 mS) where the "Call Confirmation" signal is of permanent "stop" polarity, or by permanent "stop" polarity where the "Call Confirmation" signal is given by a short impulse of "stop" polarity.

Note : It is remarked that in the case of calls to be set up from an International Telex Position to a distant automatic network, it is generally possible to give only one signalling criterion for the two signals (a) (Call Confirmation) and (b) (Proceed to select) above-mentioned.

c) "Call Connected" Signal.

In the case of calls established between two manual International Telex positions, this signal is given by the abbreviation "D F" transmitted by the terminal operator to the calling operator, as specified in Article 25 (para. 2 (d) and 3 (g)) of Recommendation No. 861.

In the case of calls established by an International Telex Position to a distant automatic network, the indication "Call connected" is given on the International Telex Circuit by the following signalling conditions :

1. When there is already permanent "stop" polarity on the path from the automatic network to the international telex position, either :
 - (i) an impulse of "start" polarity (e. g. 100 mS),
 - (ii) telegraph signals (e. g. the answer-back of the connected subscriber),
 - (iii) a combination of (i) and (ii) mentioned above.
2. When there is still "start" polarity on the path from the automatic network to the international telex position, either :
 - (i) a return of permanent "stop" polarity,
 - (ii) a return of permanent "stop" polarity followed by telegraph signals (e. g. the answer-back of the connected subscriber).

d) "Clearing" Signal.

It seems necessary to give more precision to the definition given for the "clearing" signal in Article 23 para. 1 (3) of Recommendation 861. In effect, when the "clearing" signal is given by the subscriber over an established connection, it signifies the end of the call.

The receipt of this signal and the consequent release of the equipment at the far end should be confirmed by the return, after a short delay, of permanent "start" polarity over the backward transmission path.

This return of permanent "start" polarity should be uninterrupted to prevent false calls as mentioned in Article 23 para. 2 of Recommendation No. 861.

It seems essential that, in case of a communication between two or more manual international telex positions, the return of the release signal of permanent "start" polarity be independent of the disconnection of the cord (s) by the operator (s) at the far end (s).

The stipulations of Article 23, para. 1 (3) state that a clearing signal of 300 mS must occasion the release of the equipment at the far end. In many existing manual or automatic systems, however, a clearing signal of only 300 mS will not release the communication. To ensure the release of the equipment in these systems the clearing signal should be not less than 1 second.

Attention is drawn to the fact that in those manual or automatic systems, where there are converters connecting subscribers lines with a combined transmitting and receiving path, to circuits with separate transmitting and receiving paths, there is a danger that relay interaction occurs when after receipt of the

clearing signal at the far end, the permanent "start" polarity is returned on the backward transmission path after too short a delay.

Taking into account that in these systems supervisory relays with a nominal release time of 300 mS are generally used, a delay in the return of permanent "start" polarity on the backward transmission path of at least 500 mS after the commencement of the clearing signal received over the forward transmission path would be a guarantee against this relay inter-action.

During the meeting of Study Group VII, many rapporteurs were in favour of the signalling system generally known as TW39 as a standard for international telex circuits. Other rapporteurs, however, doubted if it would be wise to standardize this signalling system where a 25 mS impulse of "stop" polarity after a long period of "start" polarity are used, for the following reasons :

1. When VF-systems insensitive to great variations on level are introduced in future, the threshold level of the receivers of these systems will have to be so low that certainly the problem of preventing false calls (due to crosstalk, etc.) will become a difficult one. It will then be necessary to introduce a certain delay in these receivers for the inversion of permanent "start" polarity to "stop" polarity. In that case, however, an impulse of 25 mS "stop" polarity after a long period of "start" polarity would be shortened and when there are several of these VF-channels in series it might even be impossible to receive that impulse at all. In general a certain delay time is also introduced in the switching systems to keep short calls ineffective, however, it seems desirable that the conditions giving rise to false calls should be suppressed in the transmission equipment.

2. The design of regenerative repeaters, which need to be introduced in future, might perhaps be complicated when transmission of this 25 mS impulse is necessary, especially when due to distortion a shortening to 20 mS or less may be expected.

Geneva Question No. 12 :

What improvements can be made in switching technique to eliminate false calling signals ?

Note : In view of what has been observed on telephone circuits used for voice-frequency telegraphy, it may be considered advisable to equip line apparatus used for automatic switching with time-delay devices so as to reduce the possibility of false calling signals occurring due to the effects of noise and crosstalk and the extreme sensitivity of receivers in the absence of a telegraph carrier-frequency. Limits for this time-delay device might usefully be recommended.

Question VI, 6 b) : Can a frequency and an impulse ratio be established for dials used on international telex systems ? If so, which ?

(See Provisional Recommendation No. 869-VII/2.)

Geneva Question No. 13

In view of the need to introduce start-stop regenerative repeaters at the sending end of international Telex trunk circuits,

1. What are the characteristics and tolerances of signals, other than teleprinter signals, which the regenerative repeaters will be required to transmit ?

2. What are the acceptable tolerances on the retransmitted signals ?

Study Group VIII

Question III, 8 e) : Study on the establishment of a public switched telegraph network (Recommendation No. 381).

Study Group No. IX

Question VI, 5 b) :

1. Is it desirable that point-to-point circuits, both private and public, should be equipped with arrangements allowing the starting of the motor (" call ") at the beginning of any traffic, and stopping of the motor (" clear ") at the finish of the traffic.
2. In the case of the affirmative, what arrangements are desirable;
 - a) for private point-to-point circuits ?
 - b) for public point-to-point circuits ?

Note : For private point-to-point circuits the question can be considered as dealt with by Provisional Recommendation No. 657-VII/1.

Question VI, 5 d) (new text) :

1. Study of the use of tape or page printing apparatus in conjunction with the use of reperforators and automatic transmitters for the reception and retransmission of public international traffic (at transit centres where it is at present the normal practice to retransmit traffic).
2. Is there any need to fix a " message separation " signal composed, for example, of two code combinations, which will cause an automatic transmitter to stop when it is scanning these combinations (to allow the switching of the traffic to different destinations without rupture of the perforated tape).

Note : The explanatory phrases in parenthesis have been added to clarify the question and to make clear that the question is concerned with the retransmission of messages at some intermediate centre of reception, a concept which is lacking in the English version of the question contained in the Brussels Document of 1948.

Question VI, 5 e) : Is it possible and desirable to stipulate that the forwarding office should — as a result of the use of page-printing teleprinters at the receiving office — transmit outward traffic in a proper form without errors ?

Geneva Question No. 17

1. Is there a need to envisage facilities additional to those at present provided by the Alphabet No. 2 :
 - A. For the needs of the public service ?
 - B. For the needs of the subscribers service ?
2. If so, what should these facilities be ?

Note : Study Group No. IX has to study Part A of the Question; Study Group No. XI is to study Part B.

Study of Geneva Question No. 17 suspends study of Brussels Question VI, 4 a) by Study Group No. III.

Question VIII, 5 : Study of the proposal of the United States of America, concerning :

1. Signals and transmission of telegrams, that is :
 - a) underlined terms,
 - b) fraction separator,
 - c) time of handing in,
 - d) collation and repetition by means of abbreviated signals.

2. Modifications to existing telegraph codes.

Remark : Since the Paris Conference, only part 1 b of this question remains under consideration. The proposition of the United States of America on this subject is the following :

b) *Fraction separator.*

Chapter IX, Article 35, Paragraph 217 of the Telegraph Regulations (Cairo revision 1938) specifies that figures and letters in a mixed group, and whole numbers and fractions in mixed numbers must be transmitted with the equal sign as a connective pattern. The resultant message copy, as prepared for delivery to the addressee, is likely to cause confusion in the minds of persons not familiar and not concerned with International Telegraphic Regulations. In addition, the general use of the same operating signal for the completely different purpose of separation between the heading and text and the text and signature of a message is confusing and introduces a serious complication into the problem of conversion between telegraphic codes. A further point is that it has been separately recommended in the U. S. proposal for standardization of telegraphic codes that the equal sign or double dash be eliminated from the International Printing Telegraph Alphabet.

In view of the above considerations it is recommended that the hyphen serve as the standard connecting element between whole numbers and fractions and between letters and figures in mixed groups and that the operating regulations be altered accordingly.

Note by the Permanent Secretariat of the C. C. I. T. : In the Paris Revision (1949) of the Telegraph Regulations, this subject is dealt with in Chapter IX, article 34, figures 220 and 221.

The International Telegraph Conference at Paris has amended the Cairo Regulations on the transmission of whole numbers, followed by fractional numbers (see article 34, point 221 of the Telegraph Regulations-Paris Revision).

Resolution No. 17 annexed to the Telegraph Regulations (revised in Paris, 1949) :

Handing in of Telegrams by Telex Service Subscribers

The International Telegraph and Telephone Conference, Paris 1949,

considering

that telegrams handed in by subscribers to the Telex service for retransmission over general international circuits raise questions on which there should be rules governing such matters as indications of origin, transmission of subscribers' numbers, etc.;

requests

the C. C. I. T. to consider what changes should consequently be made in the Telegraph Regulations.

Question VIII, 6 h) : In the event of breakdown in wholly telegraph connexions, is there any need to recommend that telegraph offices utilize among themselves telex service circuits and start-stop apparatus located in the offices, pending the setting-up of a European automatic telegraph network? If so, what would be the transit charges?

Question VIII, 9 : Study of operating procedure between fixed stations (Recommendation No. 891).

Geneva Question No. 19

Revision of Recommendation No. 801 — delay in transmission of telegrams.

Annex :

Draft of Recommendation No. 801 (submitted by the Swiss Administration).

Draft Recommendation (Recommendation No. 801 amended)
Speed of transmission of telegrams

The C. C. I. T.,

considering

that the present speed of telephonic communications and of airmail makes it necessary for Administrations and private operating agencies to be acquainted with the times of transmission of telegrams, with a view to seeking possible means of improving them;

and that, for the improvement of transmission times, it may be useful to have some bases for comparison,

declares the view

a) that Administrations and private operating agencies should cause statistics of the speed of transmission to be compiled annually during three working days in the second fortnight of the month of October, such statistics to be drawn up by the receiving office in two returns and in accordance with forms appended hereto;

b) that the Director of the C. C. I. T. should undertake to centralize the statistical data and to communicate the results, in suitable diagrammatic form, through the medium of the Secretary-General of the Union for publication in the Telecommunication Journal;

c) that this diagram should be accompanied by two returns (Returns A and B) in absolute figures and in percentages, in accordance with the forms appended hereto, of the speed of transmission of outgoing telegrams transmitted by each Administration and private operating agency to which the information received relates;

d) that, although it is not at present possible to fix a maximum time for the transmission of international telegrams, it is nevertheless desirable :

1. That 75 % of the telegrams originating in the locality of the sending office should be transmitted to the receiving office within a period of 30 minutes.
2. That 75 % of the other telegrams from the country of the sending office should be transmitted to the receiving office within a period of 45 minutes.

Study Group No. X

Resolutions Nos. 8 and 11 annexed to Telegraph Regulations (Paris Revision)

Resolution No. 8

Traffic to be routed over the Telecommunication Network of the Aeronautical Service

The International Telegraph and Telephone Conference, Paris, 1949,

considering

1. that the public telecommunication network has been equipped to insure the handling of international private telegraph traffic;
2. that a special telecommunication network for aeronautical services exists, established and operated by Governments or on their behalf, termed the Telecommunication Network of the Aeronautical Service;
3. that I. C. A. O. having regard to the needs of government aeronautical services and of air transport companies, is studying the classification of the traffic carried, or which might be carried in the future on this special network;
4. that some of the existing or future traffic relating to the operation of international air services, such as booking seats in aircraft or general matters concerning air transport may be regarded as "private telegrams" within the meaning of that term, as defined in Annex 2 to the Convention;
5. that the routing of such traffic over the Telecommunication Network of the Aeronautical Service instead of over the network which is provided for the international public telecommunication services operated by Administrations and recognized private operating agencies, raises problems of serious concern to the Members and Associate Members of the Union,

expresses the opinion

that, on the one hand, messages relating to the operation of international air services (such as messages concerning booking of seats in aircraft or general matters concerning air transport) should be transmitted over the public telecommunication network (including leased circuits); but that, on the other hand, in certain places and in certain circumstances, there may be economic and other advantages in using the special Telecommunication Network of the Aeronautical Service for handling certain of these messages;

invites

the Director of the C. C. I. T. to organize in collaboration with the appropriate organ of the I. C. A. O. and with the assistance of other organizations which may be interested, a study as to the extent to which, and under what conditions, messages of air transport companies, other than those of the flight safety and flight regularity categories, as defined in current I. C. A. O. documents, should be carried on the Telecommunication Network of the Aeronautical Service;

requests

the Secretary General to invite I. C. A. O. to collaborate with the I. T. U. in such a study; and

recommends

the Administrative Council to consider in due course the action to be taken in the light of the conclusions of the C. C. I. T. and whether it might not be appropriate to enter into an agreement with I. C. A. O. on this subject.

*Resolution No 11***Rates to be applied to messages routed over the Telecommunication Network
of the Aeronautical Service**

The International Telegraph and Telephone Conference, Paris, 1949,

noting

that I. C. A. O. acknowledges that the I. T. U. is the competent organization to study the question of rates to be paid by air transport companies for certain telegrams, such as those concerning the booking of seats in aircraft or general matters concerning air transport, which are routed over the Telecommunication Network of the Aeronautical Service;

considers

that these rates should not contain any element of preference in relation to the rates for similar telegrams forwarded over the public telecommunication network, and that, so far as possible, they should be the same as these latter rates; and

requests

the Director of the C. C. I. T. to ensure that this opinion be borne in mind during the joint study to be undertaken with I. C. A. O. in accordance with Resolution No. 8.

(See Provisional Recommendation No. 961-X/4 and C. C. I. T. Circular 13/51 of 14 September 1951.)

Resolution No. 10 annexed to Telegraph Regulations-Paris Revision: New Tariff Systems Regulations
(Study suspended : see Provisional Recommendation No. 903-X/2).

Resolution No. 12 annexed in the Telegraph Regulations-Paris Revision 1949 :

**Study by the C. C. I. T. and the C. C. I. F.
of Tariff applicable to lease of Circuits to Meteorological Services**

The International Telegraph and Telephone Conference, Paris, 1949,

considering

the system of renting telegraph and telephone circuits;

recommends

that the C. C. I. T. and C. C. I. F. study if and under what conditions reductions in the rates for rented circuits could be accorded to the meteorological services.

Study Group No. X has issued the following draft recommendation on this subject :

Tariff applicable to lease of circuits to meteorological services

Study Group X of the C. C. I. T.

having examined the observations made by the various Administrations with reference to Resolution No. 12 annexed to the International Telegraph Regulations, Paris 1949;

considering

that no reduction should be granted in the rental for leased telegraph circuits, whatever be the character of the organizations using them;

that nevertheless the reductions at present granted to the meteorological services by certain Administrations might be regarded, to some extent, as an extension of the special rates provided for in the International Telegraph Regulations in favour of meteorological telegrams;

recommends

that so far as possible no reduction in tariff should be granted for the leasing of circuits to the meteorological services;

and considering

that it would be desirable that the C. C. I. T. should proceed to study the question of the special rates for meteorological telegrams with a view to establish proposals on this subject which might in due course be submitted to the next International Telegraph and Telephone Conference;

resolves

to continue the study of the question.

Note : Provisional Recommendation X/5 submitted to administrations has not yet met with unanimous approval and is still under consideration by Study Group No. X; however the final " considering " has raised no objection on the part of administrations and the study which it considers should be undertaken under reference " Geneva 20 " (see C. C. I. T. Circular 14/51 of 12 September 1951).

Question Geneva 20 : Study of the question of special rates of meteorological telegrams in order to establish the proposals to be submitted at the next International Telegraph and Telephone Conference.

Resolution No. 16 annexed to the Telegraph Regulations (Paris Revision 1949) (extract) :

Charges for Phototelegrams

The International Telegraph and Telephone Conference, Paris, 1949,

considering

that the apparatus and operating methods used as a basis for the calculation of the phototelegram rates set forth in Article 68 of the Telegraph Regulations are largely obsolete;

requests

the C. C. I. T. to study new standards on which a tariff structure for facsimile and phototelegram transmissions could be based.

Note : Provisional Recommendation No. 982 (X/3) was issued following this study.

Resolution No. 18 annexed to the Telegraph Regulations (Paris Revision 1949).

Telegraph Channels for the Transmission of Transit Telegrams

The International Telegraph and Telephone Conference, Paris, 1949,

considering

Netherlands Proposal 139 (List of Proposals, pages 74 and 75);

decides

that the C. C. I. T. should be requested to investigate whether rented telegraph channels could be made available to Administration and/or recognized private operating agencies for the trans-

mission of transit telegrams, and, if so, under what conditions, it being understood that the cost of renting would replace the transit charge per word.

Note : *Study Group No. X has issued the following Draft Recommendation X/6 on this subject :*

C. C. I. T. Study Group X,

having discussed Resolution No. 18 annexed to the Paris Telegraph Regulations;

considering

- a) the fact that modern technique has made it possible to set up efficient wire circuits between non-adjacent countries in Europe, at moderate cost;
- b) that several Administrations have expressed a wish that for direct wire transit, in the cases mentioned under a) above, a tariff with a maximum subscription rate based on the leased circuit system shall be applied;

declares the view

1. that the study of this matter be continued;
2. that pending the results of this study, Administrations might consider the possibility of a provisional solution based on special arrangements;
3. that the Administrations concerned should keep the C. C. I. T. informed of such special arrangements.

This Provisional Recommendation submitted to administrations has not met with unanimous approval and will still have to be considered by Study Group No. X (see circular C. C. I. T. No. 14/51 of 12 September 1951).

Study Group No. XI

Question Geneva No. 17 : (see text of question under heading Study Group No. IX)

Question III, 8 c) :

1. Are there any grounds for introducing, in the international system, duplex working between telex subscribers? If so, what would the terminal and transit charges be?
2. In the event of there being no regular exchange of answer-back codes, how would the start of the timing be determined?
3. What special monitoring devices are to be introduced in international telex positions?
4. Should the use of a special teleprinter be made obligatory for the supervision of transmissions among subscribers and how will subscribers having duplex facilities at their disposal be denoted?
5. Is it desirable to use apparatus of such a type that the equipment of each subscriber who has duplex facilities at his disposal will be found, on a call being made, in the simplex condition so as to obviate the possibility of the regular answer-back procedure being unavailable?

Note : *Study Group No. XI has issued the following Draft Recommendation XI/I :*

C. C. I. T. Study Group No. XI

considering

- a) that the introduction of duplex operation in the international telex service may be of interest;
- b) that there is justification for prescribing certain technical directives to be observed by the administrations that desire to carry out trials of duplex operation in the international telex service;
- c) that it is necessary to pursue the study of this question;

declares the view

1. that the administrations which decide to authorize duplex operation in the international telex service should make the requisite technical arrangements to maintain the answer-back procedure recommended by the C. C. I. T. (cf. Avis 861, Art. 24 and 25);

2. that the possibility of taking a local record of a telex subscriber's transmission should be maintained, i. e. that the subscriber participating in the duplex telex service should be equipped with two teleprinters;

3. that, in the case where duplex international telex communication would be permitted, the tariffs for the duplex communication would be on the same basis as the simplex communication;

4. that the reporters of the administrations operating a duplex telex service either internally or in the international system should advise the telex study group of the technical arrangements and operating methods adopted.

Point 3 of the substance of Recommendation has not met with the unanimous approval of administrations and is still under consideration of Study Group No. XI (see Circular C. C. I. T. 14/51 of 12 September 1951).

Question VI, 6 c) : Should subscribers' equipment be so arranged that the called subscriber may free himself from the stipulations that a call must be received, the answer-back taken, the message transmitted and the connexion cleared without the intervention of the called subscriber, unless the calling subscriber receives a particular signal indicating that the subscriber is temporarily absent, or unless the call is diverted to another position (for example, to a call-office or an overflow position)?

Comments of Study Group No. VII on this question :

Study Group VII has considered this question, and it is clear that much consideration would have to be given to the technicalities involved, before general agreement could be reached as to the method of providing the facility mentioned in the question.

So many Administrations, however, have doubted whether such a facility should be granted at all, that Study Group VII considers that before it be involved further in the technical study of the question, the question itself should be referred to Study Group XI in order that a definite reply should be given as to whether the facility posed in the question is operationally desirable. Only if the answer is then in the affirmative, should Study Group VII consider the technical means to give effect to the decision.

The attention of Study Group XI is drawn to the fact that subscribers may require to free themselves from the obligation to receive calls either for short and frequent periods, for example each night, or for relatively long periods, for example several days.

It would be useful to clarify for each of these cases the facilities given to calling subscribers when the called subscriber is closed down.

It should also be noted that in the absence of an answer in the affirmative to this question, then Recommendation No. 861, Art. 24, para. 6, which specifies that a subscriber's equipment must be arranged in such a way that "a call can be received, the answer-back taken, and the message transmitted without the intervention of the called subscriber" would remain in force.

Question VIII, 6 c) : Is there a case for authorizing international conference calls?

Question VIII, 6 d) : Is there a case for introducing international calls for broadcast transmission in the telex service?



List of Study Group of the C.C.I.T.

Study Group No.	Administrations participating in the Group at the Brussels Meeting	Administration to provide the Principal Rapporteurs	Study Group No.	Administrations participating in the Group at the Brussels Meeting	Administration to provide the Principal Rapporteurs
I Telegraph, Technical, General	Argentina Italy Brazil France Hungary Poland United Kingdom United States	<i>Italy</i> (M. Albanese)	VII Technical aspects of switching in the service of start-stop apparatus	United Kingdom Austria Czechoslovakia Denmark France Italy Netherlands Poland Hungary	<i>United Kingdom</i> (M. Nancarrow)
II Technical aspects of the establishment, operation and maintenance of telegraph channels	Netherlands France Italy Poland Portugal Sweden United Kingdom Hungary	<i>Netherlands</i> (M. Van Lommel)			
III Technical aspects of telegraph apparatus	France Austria Czechoslovakia Denmark Italy Netherlands Poland Portugal United Kingdom United States	<i>France</i> (M. Pellé)	VIII Establishment of the European Telegraph Network operated by start-stop apparatus	Czechoslovakia Austria Denmark France Italy Netherlands Poland Rumania Switzerland United Kingdom Hungary	<i>Czechoslovakia</i> (M. Lizka)
IV Photo-telegraphy and Facsimile	United Kingdom France Italy United States	<i>United Kingdom</i> (M. Nancarrow)			
V Protection			IX Operational methods and quality of service	Portugal Argentina Canada Czechoslovakia France Italy Netherlands Poland Sweden Switzerland United Kingdom United States Hungary New Zealand	<i>Portugal</i> (M. Saturnino)
VI Telecommunication vocabulary, graphical symbols, letter symbols and universal decimal classification	France Argentina Austria Italy Portugal Sweden United Kingdom United States	<i>France</i> (M. Collet)			

Study Group No.	Administrations participating in the Group at the Brussels Meeting	Administration to provide the Principal Rapporteurs	Study Group No.	Administrations participating in the Group at the Brussels Meeting	Administration to provide the Principal Rapporteurs
X Services offered to users and rates other than telex rates	Italy Czechoslovakia Denmark France Netherlands Poland Portugal Rumania Sweden Switzerland United Kingdom United States Canada Hungary New Zealand	Italy (M. Gnome)	XI International service of telegraph subscribers and rates relating thereto	Netherlands Austria Belgium Czechoslovakia Denmark France Italy Luxemburg Norway Poland Switzerland United Kingdom United States Hungary	Netherlands (M. Perry)

**POSITION IN REGARD TO STUDIES PROCEEDING JOINTLY
BETWEEN THE C. C. I. T. AND ANOTHER C. C. I.
OR OTHER INTERNATIONAL ORGANIZATION
(AS AT 15 SEPTEMBER 1951)**

<i>Question</i>	<i>Organizations concerned</i>	<i>Position</i>
III. O and C. C. I. R. No. 18 and III. I b) (S. G. I)	C. C. I. T., C. C. I. R., C. C. I. F.	The Sixth Plenary Meeting of the C. C. I. R. issued Report No. 1 on this proposal (see Doc. 597 — C. C. I. R. VI). The C. C. I. F. is interested in the question in connexion with the transmission of selection and signalling impulses. The question will be dealt with under the direction of S. G. I of the C. C. I. T. (see Circular C. C. I. T./12/51 — C. C. I. R. C. M. T./I. of 16 October 1951).
III 6 b) (S. G. II)	C. C. I. T., C. C. I. F.	Collaboration of the C. C. I. F. requested under Provisional Recommendation 711.
Geneva No. 8 and Geneva No. 11 (S. G. II)	C. C. I. T., C. C. I. F.	Collaboration of the C. C. I. F. requested under Provisional Recommendation 712.

<i>Question</i>	<i>Organizations concerned</i>	<i>Position</i>
V. 1 e) (S. G. II)	C. C. I. T., C. C. I. F.	Agreement on the principle requested from the C. C. I. F.
V. 1. f) (S. G. II)	C. C. I. T., C. C. I. F.	Discussion continuing with the C. C. I. F.
V. 2 b) (S. G. II)	C. C. I. T., C. C. I. F.	Joint study proceeding.
V. 6 (S. G. II)	C. C. I. T., C. C. I. R. (Question 43)	See Study Programme No. 9 of the Sixth Plenary Meeting of the C. C. I. R. (Doc. 480 — C. C. I. R. VI). The question will be dealt with under the direction of the C. C. I. T. (Circular C. C. I. T. — C. C. I. R. 12/51).
Paris Resolution No. 13 (S. G. III)	C. C. I. T., I. C. A. O.	I. C. A. O. to be informed of the result of the study.
Question C. C. I. R. No. 19 (S. G. III of C. C. I. T.)	C. C. I. T., C. C. I. R.	See Study Programme No. 27 of the Sixth Plenary Meeting of the C. C. I. R. (Doc. 483 — C. C. I. R. VI). The question will be dealt with under the direction of the C. C. I. R. (Circular C. C. I. T. — C. C. I. R. 12/51 of 16 October 1951).
V. 8 a) (S. G. IV)	C. C. I. T., C. C. I. R., C. C. I. F.	Appointment of Joint C. C. I. T. — C. C. I. R. Study Group (see Circular C. C. I. T. — C. C. I. R. 12/51 of 16 October 1951).
V. 8 b) (S. G. IV)	C. C. I. T., C. C. I. F.	Joint study proceeding.
VI. 8 (S. G. IV)	C. C. I. T., C. C. I. R. and World Meteorological Organization (W. M. O.)	Study to be resumed on the new data of S. G. IV.
II. 1, II. 2 a), II. 2, b) II/4 (S. G. VI)	C. C. I. T., C. C. I. F., C. C. I. R., Fédération internationale de documentation (F. I. D.), International Electrotechnical Commission (I. E. C.)	Each C. C. I. to pursue its studies within its own sphere, pending the establishment of a triple study group.
III. 8 e) (S. G. VIII)	C. C. I. T., C. C. I. F.	Collaboration through the " Programme général d'interconnexion ".
Paris Resolutions Nos. 8 and 11 (S. G. X)	C. C. I. T., I. C. A. O.	Provisional Recommendation 961 (X/4) and C. C. I. T. Circular No. 13/51 of 14 September 1951.
Paris Resolution No. 12 (S. G. X)	C. C. I. T., C. C. I. F.	The C. C. I. F. has been informed of the study made by the C. C. I. T.
Theory of communications (Question C. C. I. R. No. 44)	C. C. I. F., C. C. I. T., C. C. I. R.	In course of organization under the direction of the C. C. I. R. (see Circular C. C. I. T. — C. C. I. R. 12/51 and Study Programme No. 10 of the Sixth Plenary Meeting of the C. C. I. R. : Doc. 483 revised — C. C. I. R. VI).

<i>Question</i>	<i>Organizations concerned</i>	<i>Position</i>
Rationalized Giorgi units system	C. C. I. F., C. C. I. T., C. C. I. R.	In course of organization under the direction of the C. C. I. R. (see Circular C. C. I. T. — C. C. I. R. 12/51 and Opinion No. 6 of the Sixth Plenary Meeting of the C. C. I. R.; Doc. No. 543 — C. C. I. R. VI).
“ Programme général d'interconnexion ” (S. G. II, VIII, and XI of the C. C. I. T.)	C. C. I. T., C. C. I. F.	Collaboration organized and in action.
Telegraph maintenance (S. S. G. II)	C. C. I. T., C. C. I. F.	Collaboration organized and in action.
