THE INTERNATIONAL TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE
(C.C.I.T.T.)

IVth PLENARY ASSEMBLY

MAR DEL PLATA, 23 SEPTEMBER - 25 OCTOBER 1968

WHITE BOOK

VOLUME II-A

Telephone operation and tariffs

Published by
THE INTERNATIONAL TELECOMMUNICATION UNION
1969

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General Tariff Principles
Costing — Lease of Circuits

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CONTENTS OF THE C.C.I.T.T. BOOKS APPLICABLE AFTER THE IVth PLENARY ASSEMBLY (1968)

(WHITE BOOK)

Each volume contains, where appropriate, extracts from contributions received on the subject of the volume concerned whenever their interest is such as to warrant publication.

PART I

GENERAL TARIFF PRINCIPLES
COSTING STUDIES — LEASE OF CIRCUITS

1. Series D Recommendations

2. Questions entrusted to Study Group III

SERIES D RECOMMENDATIONS

LEASE OF CIRCUITS

Contents of Series D Recommendations

RECOMMENDATION D.1

GENERAL PRINCIPLES FOR THE LEASE OF INTERNATIONAL TELECOMMUNICATION CIRCUITS FOR PRIVATE SERVICE

Preamble

This Recommendation relates to the international circuit itself (circuit between two international centres, or two centres regarded as such for the purposes of this Recommendation). Charging for any extensions of this circuit on the territory of the two terminal countries concerned is, where appropriate, subject to special regulations provided for it by the Administrations * of those countries.

This Recommendation applies to circuits used:

a) at the same time in both directions;

b) alternately in either direction;

c) in a single direction.

* or recognized private operating Agency(ies).

It does not apply to circuits for television transmission.

This Recommendation is in two parts:

Part I—General provisions.

Part II—Multiple-user lease.

Part I—General provisions

1. *Definition—General principles*

1.1 The international telecommunication leased circuit service consists in making an international telecommunication circuit available to a user for his exclusive use.

1.2 When the lease of a circuit has been granted, the connection between the terminal stations is set up once and for all for the period of the lease in such a way that the international centres at the extremities of the leased circuit do not need to intervene. However, arrangements must be such as to enable the appropriate staff at these centres to supervise as freely as is thought necessary.

Moreover, it is desirable that the equipment on which the leased circuits terminate in the user's premises should not allow the circuits to be used in conditions other than those authorized.

1.3 Such a service is normally authorized in international relations only when telecommunication circuits remain available after the needs of the public telecommunication services have been satisfied.

1.4 Administrations * reserve the undisputed right to withdraw leased telecommunication circuits if in their opinion this is required in the general interest. If necessary, such withdrawal may be made at very short notice, without Administrations * having to observe the period of notice prescribed in 4.2 below.

2. *Conditions of acceptance*

2.1 Within the limits fixed by Administrations * in each case, a leased circuit may be used only to exchange calls or signals relating solely to the interests of the renter or renters; these calls or signals may not originate from third parties, nor shall they be addressed to third parties.

2.2 Except where an Administration * has decided otherwise, the retransmission of traffic from one leased circuit to another or interconnection of leased circuits is allowed, provided that both the circuits concerned are leased by the same renter.

In the event of an interconnection between leased circuits, Administrations * are not obliged to guarantee the quality of transmission over such a connection.

2.3 *Interconnection with the public network:*

2.3.1 In countries where interconnection between national leased circuits and the public network is not permitted, the interconnection of an international leased circuit with the public network is generally not permitted.

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* or recognized private operating Agency(ies).

2.3.2 In countries where interconnection between national leased circuits and the public network is permitted, the interconnection of an international leased circuit with the public network shall in principle be admissible, subject to the following conditions:

a) the Administrations * concerned will take all steps necessary to ensure that the traffic is restricted to the user's own business;

b) interconnection with the public network will, except where otherwise agreed by all Administrations * concerned, be restricted to installations within the terminal country's national boundaries.

In the event of the interconnection of an international leased circuit with the public network, Administrations * are not obliged to guarantee the quality of transmission over such a connection.

2.4 The apparatus and equipment used for the operation of leased circuits must, if provided by the renters, meet the technical conditions laid down by Administrations *.

2.5 Administrations * will take all necessary action to refuse or cancel the lease of telecommunication circuits to agencies or other organizations:

— set up to transmit or receive, on behalf of third parties, messages intended to be sent or received by telephone, telex, the public telegraph service, or by any other means; or

— set up to forward information or messages, on behalf of third parties, so as to evade full payment of the charges due for the complete route.

2.6 Administrations * shall be entitled to take any steps to ensure that the above provisions are respected.

3. *Collection of charges—accounting*

3.1 When the leased circuit does not pass through a transit country, two methods shall be permitted:

3.1.1 Each Administration * of the two terminal countries collects its own share of the international leased circuit rental from the renter resident in its own country. This method has the advantage of avoiding the need to exchange international accounts and to make transfers of foreign currency.

3.1.2 The Administration * of the country where the renter who applies for the lease resides collects the rental for the whole leased circuit; in this case, this Administration * credits the other terminal Administration * through the international accounts with the share due to it.

3.2 If the leased circuit passes through one or more transit countries, the terminal Administrations * shall agree with the transit Administration(s) * on the method to be adopted for collecting and international accounting for the charges due to it (them).

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* or recognized private operating Agency(ies).

4. *Duration of the lease, charging, cancellation*

4.1 Except as provided in 4.5 following for temporary services, the lease shall last for at least one month.

4.2 The lease shall be continued thereafter by tacit agreement until cancelled by either party. Notice of cancellation must be given normally 7 days in advance of the effective date of cancellation. The charges for fractional parts of a month beyond the first month shall be in accordance with 4.4.1 following.

4.3 The lease should normally be payable a month in advance.

4.4 In calculating the duration of the lease, a month shall mean one calendar month. Moreover, the day when the circuit is made available shall not be reckoned, whereas the day when the circuit is withdrawn shall be reckoned as a full day. Thus, a period of lease covering one month or more is reckoned as follows:

a) count the number of days beginning on the day following the day on which the circuit was set up until the end of the month;

b) thereafter, count the number of full calendar months, if any;

c) count the number of days in the last month, including the day on which the circuit was withdrawn.

4.4.1 As regards charging:

— full calendar months are subject to the monthly rental

— fractions of a month are subject to a daily charge equal to 1/30th of the monthly rental.

4.4.2 *Examples*

Life of a lease from the time of setting up until the day of withdrawal	Chargeable time	Charge
30 October - 15 December 30 October not counted 31 October = 1 day November = 1 month 1-15 December = 15 days	1 month 16 days	1 monthly rental + $\frac{16}{30}$ of this rental
30 November - 15 January 30 November not counted December = 1 month 1-15 January = 15 days	1 month 15 days	1 monthly rental + $\frac{15}{30}$ of this rental
4 January - 10 February 4 January not counted 5 January-31 January = 27 days 1 February-10 February = 10 days	37 days	$\frac{37}{30}$ of monthly rental

4.5 By agreement between the Administrations * concerned, the lease can be for a period of less than one month.

4.5.1 In calculating the life of a lease of less than one month, one day shall mean a period of 24 consecutive hours.

The life of a lease should be reckoned in multiples of 24 hours, the period starting from the time when the circuit is set up until the time when it is withdrawn. If the number of days thus obtained contains a fraction of 24 hours it should be rounded up to the next whole number.

Examples:

Circuit set up on 1 June, at 09.00 hours, cleared on 5 June at 09.00 hours:
4 × 24 hours, i.e. 4 chargeable days.

Circuit set up on 1 June, at 09.00 hours, cleared on 5 June at 11.00 hours:
(4 days + 2/24 days), i.e. 5 chargeable days.

4.5.2 In this case, the charges shall be calculated as follows:

a) for the first day of lease: 1/10th of the monthly rental;

b) for the second day of lease: 1/10th of the monthly rental;

c) for the next 8 days of lease: 1/20th of the monthly rental, per day;

d) after the first 10 days: 1/25th of the monthly rental, per day, the total amount being in no case more than the monthly rental.

4.6 The leases considered in 4.1 and 4.5 above are full-time leases, i.e. for 24 hours per day.

4.6.1 However, the Administrations * concerned may in some cases permit part-time leases.

4.6.2 The conditions of lease and the charges shall then be fixed by agreement between the Administrations *.

5. *Refunds*

5.1 In the event of non-operation of a leased circuit for which an Administration * is responsible, a refund may be made if there has been non-operation for a period of at least 3 consecutive hours and it has been reported by the renter.

For each period of non-operation of 3 consecutive hours, the amount of the refund should be equivalent to 1/5th of the charge for a day's lease, which is:

— for a lease of more than one month, 1/30th of the monthly rental;

— for a lease of less than one month, the total rental divided by the number of days reckoned in the lease,

with a maximum of one day's rental for any period of 24 consecutive hours.

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* or recognized private operating Agency(ies).

5.2 In the intercontinental service, the minimum period of interruption qualifying for a refund may be fixed at less than 3 hours. If so, the amount of the refund is decided on by the Administrations * concerned.

5.3 However, the Administrations * need not consider requests for refunds resulting from unfavourable propagation conditions for radio circuits.

5.4 Requests for refund of charges for the use of the public telecommunication service during the period when the leased circuit is not available shall not be entertained.

5.5 No refund shall be granted when an interruption (regardless of how long it lasts), or the non-operation of the leased circuit, is due to the negligence of the renter or to a fault in the apparatus or equipment belonging to him, and maintained and operated by him.

Part II — Conditions for a multiple-user lease

1. *General principles*

1.1 A " multiple-user lease " may be concluded with a view to enabling an international circuit to be used by more than one customer at either or both ends thereof.

1.2 The general provisions in Part I of this Recommendation, relating to ordinary or single lease [1] shall apply to multiple-user leases.

The following special provisions shall also apply to these latter:

2. *Conditions governing the grant of multiple-user leases*

2.1 Multiple-user lease may be considered only in favour of persons, companies, firms and institutions:

— carrying on identical activities, or

— active in the same field.

The grant of multiple-user leases should not lead to the setting up of a private network for the benefit of separate firms not active in the same field.

Therefore correspondence passed over rented circuits must concern only the undertaking(s) or interest(s) for which the circuits have been rented.

2.2 The Administrations * concerned will consult each other as to whether, in the light of the above, a multiple-user lease may properly be granted.

2.3 For this purpose, requests for multiple-user lease, addressed to the relevant Administrations *, must be accompanied by a list of the prospective users and by documentary proof that such users meet the requirements of paragraph 2.1 above.

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* or recognized private operating Agency(ies).

[1] i.e., a single user of each end of the circuit.

3. *Charges*

3.1 The charge for a multiple-user lease shall include a surcharge of 37.5% of the charge for a single lease of an international circuit in the same relation.

3.2 However, an Administration * shall be free to levy smaller surcharge, or to levy no surcharge at all, for its part of the circuit.

3.3 No discount will be permitted for leasing of a group of (telegraph) circuits provided for multiple users.

RECOMMENDATION D.2

CONDITIONS FOR THE LEASE OF CONTINENTAL CIRCUITS (TELEGRAPH OR TELEPHONE TYPE CIRCUITS) FOR PRIVATE SERVICE

Conditions for the lease of intercontinental telecommunication circuits are set out in Recommendation D.3 and shall generally be subject to special agreement among the Administrations * concerned. Therefore the conditions mentioned in Recommendation D.2 do not apply to intercontinental circuits. The conditions here stated are the result of studies carried out on the European network and can serve as a guide as well to other Administrations * with comparable networks.

1. *General conditions*

1.1 A leased continental circuit passing through a direct transit country will be charged for as if it were one circuit if no intermediate station exists in the direct transit country.

If, however, a station is connected to the circuit in the direct transit country, the circuit shall be divided into two sections for charging purposes, each section being charged for as a separate circuit.

1.2 The telephone-type circuit shall be taken as the basis for the calculation of charges for leased circuits.

1.3 The rentals are therefore indicated in this Recommendation in the following manner:

a) the rental for the lease of a normal telephone-type circuit in the same relation being taken as the reference unit; and

b) the multiplication factor shown in the right-hand column being applied to that reference unit.

1.4 By agreement among Administrations * the lease of continental telecommunication circuits may include provisions permitting the renter to put the same telecommunication circuit to various uses.

* or recognized private operating Agency(ies).

2. *Charges for leased normal telephone-type circuits* (as specified in Recommendation M.58)

Multiplication factor

2.1 Lease of a telephone-type circuit used *solely* for the exchange of telephone calls (a single telephone channel) (this rate constituting the reference unit as mentioned in 1.2 above) 1

The monthly rental for a continental telephone circuit normally used for the exchange of calls shall be equal to the charge for 6000 minutes of ordinary conversation during heavy-traffic periods in the relation concerned.

2.2 Lease of a telephone-type circuit used solely for facsimile telegraphy transmission with the equipment used being provided and maintained by the user 1

2.3 Lease of a telephone-type circuit for data transmission, whatever the speed of modulation [1] with the equipment used 1.25

2.4 Lease of a telephone-type circuit used *alternately* or *simultaneously* for the exchange of telephone calls, for telegraph transmission or for any other approved form of telecommunication in so far as combinations of these facilities are technically acceptable 1.25

2.5 Lease of a standardized telephone-type circuit to provide several telecommunication channels for use exclusively by the user, the equipment for the telephone-type channel division being provided, installed and maintained by the user (in so far as this equipment is technically acceptable) . . 1.25

2.6 No discount is allowed for the lease of a group of telephone-type circuits.

3. *Charges for leased telegraph-type circuits*

3.1 Lease of a standard (50 bauds) continental telegraph-type circuit . 0.4

3.2 Lease of a telegraph-type circuit with a modulation rate (actual or equivalent) higher than 50 bauds:

— 100-baud type 0.5

— 200-baud type 0.6

3.3 *Lease of groups of telegraph-type circuits*

A group of telegraph-type circuits shall be understood to mean an ensemble of two or more telegraph circuits of the same type, requested and operated in the same circumstances by the same renter between the same two terminal points.

[1] Within the speeds recommended by the C.C.I.T.T.

If a group of telegraph-type circuits is leased, the following discount coefficients are applied to the existing rental for a single telegraph circuit of the same type:

20% for the 2nd leased telegraph-type circuit;

30% for the 3rd leased telegraph-type circuit;

40% for all other leased telegraph-type circuits.

Note. — The rental for the lease of a telegraph-type circuit of the group should not be lower than 24% of the rental for the lease of a standardized-type telephone circuit. (This could otherwise occur if, to maintain existing liberal rates, the rental for the lease of a single telegraph-type circuit is less than 40% of that for a telephone circuit.)

4. *Charges for lease of a telephone-type circuit having special qualities*

4.1 For the provision of a telephone-type circuit having special qualities in accordance with item 3 of Recommendation M.102, surcharges can be levied by the terminal Administrations * in addition to those charges specified in paragraph 2. These additional surcharges should not exceed 1/4 of the charge share accruing to the terminal country concerned on the basis of paragraph 2.1.1.

RECOMMENDATION D.3

CONDITIONS FOR THE LEASE OF INTERCONTINENTAL TELECOMMUNICATION CIRCUITS FOR PRIVATE SERVICE

1. Study Group III has under continuing study developments in the intercontinental service with a view to the formulation of detailed recommendations as to the special conditions and charges which should apply in the intercontinental service.

2. Pending the establishment of these recommendations the Administrations concerned will agree between themselves the special conditions and charges which will apply to the lease of intercontinental telecommunication circuits for private service.

RECOMMENDATION D.4

CONDITIONS FOR THE LEASE OF CONTINENTAL CIRCUITS FOR PROGRAMME TRANSMISSIONS

1. General provisions governing the lease of telecommunication circuits, contained in Recommendation D. 1, also apply to continental circuits for programme transmissions.

2. The charges for the lease of a continental programme circuit should correspond to that for 6000 minutes of use of the programme circuit in question per month.

* or recognized private operating Agencies.

RECOMMENDATION D.5

COSTS AND VALUE OF SERVICES RENDERED AS FACTORS IN THE FIXING OF RATES

1. The income from the totality of services provided by a telecommunication organization should cover all the costs incurred by that organization, namely:

a) operating expenses;

b) interest on capital involved;

c) fiscal charges;

d) depreciation of equipment;

e) cost of research and development;

f) capital investment (as required).

For political or social reasons the rates for certain services may be so arranged that they do not cover all the costs involved. In addition, the rates applied should not create harmful competition among the various telecommunication services.

2. The C.C.I.T.T. therefore considers that the rates for the various telecommunication services should be such that they cover the items of expenditure listed above.

However, in view of the difficulty of applying rates based on these criteria, in certain cases, for the political or social reasons mentioned above, the C.C.I.T.T. considers that the over-all balance in the telecommunication services required should be achieved by applying an increase factor to the rates of other telecommunication services in the same telecommunication organization which will compensate for the deficit incurred by services run at a loss.

In determining this increase factor, the value of the service rendered to the user should be taken into consideration.

In any case the rates adopted should be such as to avoid harmful competition among the different types of service provided by the organization concerned.

Recognizing that a telecommunication service is of the greatest importance for the economic and social life of every country, the C.C.I.T.T. recommends that the surplus income from the telecommunication services considered as a whole should not be greater than the amount required for the efficient running of these services.

GENERAL TARIFF AND LEASE OF CIRCUITS QUESTIONS ENTRUSTED TO STUDY GROUP III FOR THE PERIOD 1968-1972

Question No.	Title	Remarks
1/III	Leasing of intercontinental telecommunications circuits	
2/III	Leasing of a wideband transmission facility	The categories of sound programme circuits to be considered will be defined by S.G. XV
3/III	Leased sound programme circuits	
4/III	Tariff conditions for replacing faulty leased circuits	
5/III	Sharing of the charges for leased international circuits	
6/III	Amendments and additions to Recommendation D.1	
7/III	Amendments and additions to Recommendation D.2	
8/III	Activity of data service centres	
9/III	Direct distance exchange service	S.G.s I and II to be informed on completion of study
10/III	Reduced rates during light traffic periods	S.G.s I and II to be informed on completion of study
11/III	Fixing of basic components of tariffs for the telephone and telex services (to be conducted on a regional basis)	

When a question is of interest to more than one Study Group and no Joint Study Group has been set up to deal with it, the mention of the other Study Group(s) concerned is intended for the information of the members of the Study Group to which the question has been assigned, to enable them to arrange for the necessary co-ordination *within their national* Administrations, in accordance with a decision of the IVth Plenary Assembly,

Question 1/III — Leasing of intercontinental telecommunications circuits

Comment

Sufficient experience is now available to frame Recommendations on the question, bearing in mind that uniform standards will lead to simplification and foster the development of this type of service.

Note. — Any new Recommendations will supersede Recommendation D.3.

Question 2/III — Leasing of a wideband transmission facility

Terms of lease of a wideband transmission facility, in particular:

— 48-kHz frequency band (equivalent to that of a telephone group);

— 240-kHz frequency band (equivalent to that of a telephone supergroup).

Question 3/III — Leased sound programme circuits

What in general are user requirements for leased sound programme circuits?

How can these be met?

What conditions and tariff should govern the lease of such circuits?

Note 1. — See Recommendation D.4 for the case of continental circuits.

Note 2. — Study Group XV will inform Study Group III of the categories of sound programme circuit to be taken into consideration (Question 4/XV).

Question 4/III — Tariff conditions for replacing faulty leased circuits

What recommendations concerning conditions (general conditions and tariff conditions) should be issued to ensure the rapid restoration of faulty leased circuits, including the systematic provision of stand-by circuits (or sections)?

Note 1. — This question stems from Opinion No. 4 issued by the World Plan Committee at Mexico City in November 1967, which urges that stand-by circuits be systematically provided to replace faulty leased circuits. It also originates from the considered view of Study Group III that the problem in question is basically an economic one, and therefore falls within its terms of reference.

Note 2. — The study should cover the following points, *inter alia*:

1. Can and should standards be established for " normal " restoration periods; if so, what should they be?
2. Can and should a system of priorities for restoration of leased circuits for different types of users be established; if so, what should it be?
3. Should users be offered leased circuits with special rapid restoration features; and if so what, if any, additional charge should be made?

Note 3. — Any recommendations will have to be reviewed on completion of the study of the Questions concerning reliability.

Question 5/III — Sharing of the charges for leased international circuits

(continuation of Question 4/III studied in 1965-1968)

How should the charges for leased international telecommunication circuits be shared among the Administrations * concerned?

Reasons having led to the study of this question

According to Recommendation D.2, the telephone-type circuit is taken as the reference constituent for charges for leased continental telecommunication circuits. The rental for circuits used for purposes other than the exchange of telephone conversations is fixed by applying a multiplication coefficient to the reference unit. This method has the great advantage of bringing into line the charges imposed on the lessee for circuits used for different telecommunication purposes. Nevertheless, it was not unanimously accepted during the discussions which preceded the preparation of the draft recommendation. In particular, it was pointed out that the quotas assigned to the terminal and transit countries were not always in proportion to one another for the telephone and telegraph services. In fact, for the telex service, the shares fixed according to Recommendation F.66 are relatively higher for the terminal countries and lower for the transit countries than the amounts obtained by applying the telephone charge multiplied by the coefficient prescribed for circuits of the telegraph type.

While the method provided in Recommendation D.2 for fixing the charges for the lessees seems both correct and recommendable, other methods might be envisaged for the distribution of the charge among the Administrations which have taken part in providing a circuit of the telegraph type. A method which might be suggested for this purpose is to distribute the total charge pro rata to the terminal and transit quotas in force in the given relation in the telex service.

Question 6/III — Amendments and additions to Recommendation D.1

Note. — The question of charging for leased circuits is regarded as of permanent interest. This Question represents a continuation of the study made in 1965-1968 under Question 3/III.

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* or recognized private operating Agencies.

Question 7/III — Amendments and additions to Recommendation D.2

Note. — The question of charging for leased circuits is regarded as of permanent interest. This question represents a continuation of the study made in 1965-1968 under Question 3/III.

Question 8/III — Activity of data service centres

Data service centres have been set up recently in several countries on a time-sharing basis. Users may be linked to the computer through the public telephone or telex networks.

Such a data service centre could be used as a message retransmission centre.

Should steps be taken to ensure that such centres do not take the place of telecommunication Administrations in providing public telecommunication services?

Study of this question will also involve examination of the activity of World Trade Centres.

Question 9/III — Direct distance exchange service

What recommendations should be established for making a *direct distance exchange service* available internationally?

ANNEX
(to Question 9/III)

The service envisaged is an international direct distance exchange service whereby a person in a country A might lease a circuit terminating in a local exchange of a city in another country B and be given a local telephone number in the second country B. This service implies that:

a) the leased circuit renter in country A has direct access to a public local exchange in country B at the other end of the leased circuit; and

b) conversely, in country B a subscriber of the public network at the end of the circuit can reach the leased circuit renter in country A at the distant end through the national number allotted for the termination of the leased circuit in the local exchange of country B.

The study of this question should embrace the following:

1. Conditions for setting up this service.

2. The general rate-fixing principles for such a service. It is envisaged that the charges would consist of:

   i) the normal charge for a leased channel between the terminal cities involved, and

   ii) the regular charges for calls and subscription in the national service at the " open end ".

3. The methods of settling accounts between Administrations for this type of service.

Note 1. — The study should take account of whether the circuits are to be used for incoming, outgoing or both-way calls.

Note 2. — This Question should be studied with reference to the telephone as well as to the telex service. Study Group III is first to study the question of principle involved and then inform Study Groups I and II.

Question 10/III — Reduced rates during light traffic periods

Should consideration be given to reduced rates during hours of light traffic in:

a) the automatic telex service;

b) the automatic telephone service?

in order to:

i) meet the wishes expressed by certain users;

ii) encourage the use of the international telecommunication services; and

iii) improve equipment and circuit utilization.

Note 1. — Study Group III is first to study the question of principle involved and then inform Study Groups I and II.

Note 2. — See Annexes 1 and 2 below, which present the point of view of groups of users.

ANNEX 1
(to Question 10/III)

Recommendation adopted by the 85th session of the Executive Committee of the I.C.C.

The International Chamber of Commerce (I.C.C.) has noted that in the U.S.A. new reduced interstate rates for telephone calls became effective on 1 November 1967, the major changes being:

1. extension of the evening and night periods during which reduced rates are charged, and applying the night rates also on Saturdays, Sundays and more national holidays;
2. introduction of a new " economy " rate for customer-dialled calls between midnight and 7 a.m.

In its announcement, the Federal Communications Commission stated that the new rates are designed to encourage the use of idle-time capacity of the telephone network without incurring costs associated with operator-handled traffic. The rates are also expected to encourage use of the telephone network for such new purposes as data transmission. Moreover, it is stated that the new rates might lead to substantial changes in the nation's telephone calling patterns, probably tending to smooth out a few of the present peak loads and undoubtedly leading to long-range stimulation of traffic volumes.

Seeing that reduced rates can be introduced in the U.S.A., i.e. over a country the size of a continent, the International Chamber of Commerce believes that the same benefits could be achieved in Europe, if the present reduced night rates, which are already applied in a number of European countries on a national scale, could be extended to telephone calls in the automatic

international European service, provided such a reduced night rates system should be technically and administratively possible without leading to any increase of day-time rates.

In the Federal Republic of Germany reduced rates also apply to national telex calls made between 1830 and 0700.

With the increasing number of telex subscribers and the volume of traffic, involving more and prolonged connections for the exchange of communications, it becomes more and more difficult to establish international telex calls directly during the normal working hours; frequently several attempts have to be made. The analysis below made by an international concern gives a clear picture of the difficulties experienced.

Introduction of a reduced rate system for telex calls in Europe on an international basis, similar to that proposed for telephone calls, seems the way to improve the situation. It would encourage telex subscribers to use the idle-time capacity of the international telex network, especially when computer-based switching centres are used, which can easily store non-urgent traffic until the non-peak period. Heavy traffic loads during peak periods could thus be decreased, to the benefit of many telex subscribers.

ANNEX 2
(to Question 10/III)

Night rates

Comments by the International Press Telecommunications Committee

The delays experienced in securing international and intercontinental telephone, telex and data calls during peak periods, suggest that more efficient use might be made of public networks if these types of service were offered for preferential rates during the night. Such an incentive to use international communication outside of normal office hours would lessen the incidence of non-connections and wrong numbers such as are caused by overloaded circuits. Administrations and recognized private operating Agencies would, therefore, enjoy opportunities to reduce the number of staff engaged in answering complaints and satisfying subscribers whose attempts to dial their correspondents had proved unsuccessful. Preferential night rates would also stimulate telecommunications revenues by attracting business of a non-urgent kind, not only from the telegraph service, but the mails.

The application of preferential rates for part-time circuits under permanent lease to be furnished during off-peak hours, would help to meet the requirements of newspapers and news agencies.

Question 11/III — Fixing of basic components of tariffs for the telephone and telex services (to be conducted on a regional basis)

Cost studies for fixing (for international accounting purposes) of the basic components of tariffs for the telephone and telex services.

These studies will be carried out on a regional basis by the regional groups set up by the IVth Plenary Assembly of the C.C.I.T.T. for international tariffs:

— Regional group for tariffs in Africa (TAF);
— Regional group for tariffs in Latin America (TAL);
— Regional group for tariffs in Asia (TAS);
— Regional group for tariffs in Europe (TEUR).

It will be necessary for Study Group III to propose the principles to be followed in carrying out these studies and decide on the general framework and methods to be adopted before these regional international tariff groups meet.

PART II

TELEPHONE OPERATION AND TARIFFS

1. **Recommendations relating to telephone operation and tariffs (Series E)**

2. **Telephone operation and tariff Questions entrusted to Study Group II**

3. **Supplements**

SUMMARY OF SERIES E RECOMMENDATIONS

Contents of Series E Recommendations

CONTENTS OF SERIES E RECOMMENDATIONS

CONTENTS

CONTENTS

Contents of series E recommendations

CONTENTS

CORRESPONDENCE BETWEEN *BLUE BOOK* RECOMMENDATIONS, VOLUME II, AND *WHITE BOOK* RECOMMENDATIONS, VOLUME II

Blue Book Recommendation	Corresponding *White Book* Recommendation	*Blue Book* Recommendation	Corresponding *White Book* Recommendation	*Blue Book* Recommendation	Corresponding *White Book* Recommendation
E.1	E.100	E.33	E.320	E.70 *bis*	E.253
E.2	E.140	E.34	E.122	E.71	E.207
E.2 *bis*	Deleted	E.35	E.300	E.81	E.400
E.3	E.110	E.51	E.230	E.82	E.401
E.4	E.141	E.52	E.200	E.83	E.420
E.4 *bis*	E.142	E.52 *bis*	E.280	E.83 *bis*	E.422
E.4 *ter*	E.143	E.53	E.201	E.83 *ter*	E.423
E.5	E.111	E.54	E.202	E.83 *quater*	E.424
E.6	E.112	E.55	E.203	E.84	E.402
E.7	E.113	E.55 *bis*	Deleted	E.90	E.500
E.10	E.114	E.56	E.232	E.91	E.510
E.15	E.171	E.57	E.330	E.92	E.520
E.21	E.116	E.57 *bis*	E.331	E.93	E.521
E.21 *bis*	E.117	E.58	E.350	E.93 *bis*	
E.22	E.115	E.59	E.321	E.95	E.522
E.23	E.118	E.62	E.231	E.97	E.501
E.24	E.119	E.63	Negative decision		
E.25	E.144	E.64	Negative decision		
E.26	E.204	E.65	E.205		
E.27					
E.28	E.252	E.66	Negative decision		
E.29	E.161	E.67	E.206		
E.30	E.120	E.68	E.281		
E.31	E.121	E.69	E.282		
E.32	E.323	E.70	E.251		

PART I

TELEPHONE OPERATION

CHAPTER I

DEFINITIONS

RECOMMENDATION E.100 [1]

DEFINITIONS OF TERMS USED IN INTERNATIONAL TELEPHONE OPERATION

1. Telephone call

The interconnection of two telephone stations.

2. Call request

The first application made by the caller for a telephone call is called the call request.

In automatic service, the operation of the dial (or key-set) by the caller to obtain a call with his correspondent is comparable to the call request.

3. Telephone message

An effective call over a connection established between the calling and the called stations.

4. Telephone circuit (international or trunk circuits)

1. The whole of the facilities whereby a direct connection is made between two exchanges (manual or automatic) is called a telephone circuit.

2. A circuit is called an international circuit when it directly connects two international exchanges in two different countries.

3. The term " trunk circuit " is reserved for the designation of exclusively national circuits.

Note. — The above definitions relate solely to the use of the terms in operational procedures, no matter how the circuits are actually made up.

[1] The word " international " is applied to any relation between countries whether those countries are in the same continent or not.

5. International exchange

The exchange (at the end of an international telephone circuit) which switches a call destined to or originating from another country.

6. International transit exchange

An international exchange chosen to establish telephone calls between two countries other than its own is called an international transit exchange.

7. Preparation operating

In preparation operating, after the request is recorded by an operator in the outgoing international exchange another operator in the exchange sets up the call. After the requests have been put in order at the exchange, the controlling operator sees to it that the calling station is connected on the international circuit without loss of time.

A distinction is made between:

A. *Advance preparation operating*

Advance preparation operating requires preparation at both the outgoing and incoming international exchanges.

B. *Outgoing preparation operating*

Outgoing preparation operating requires preparation at the outgoing international exchange only.

8. Demand operating

In demand operating (manual or semi-automatic), after the request has been recorded in the outgoing international exchange, an immediate attempt to set up the call is made by the operator at this exchange who took the request.

A distinction is made between:

A. *Manual demand operating*

[There are two operating methods:

a) Indirect manual demand operating
In this method of operating, the operator at the incoming international exchange always acts as an interpreter between the operator in the outgoing international exchange and the called party.

b) Direct manual demand operating

In this method of operating, the operator in the outgoing international exchange speaks with the called party direct.]

B. *Semi-automatic demand operating*

In this method of operating, the operator in the outgoing international exchange controls the automatic switching operations to obtain either the called station, or an operator in the incoming or transit international exchange (or an operator in a manual exchange in the country of destination).

9. Automatic service

In the automatic service, the calling subscriber himself dials (or operates the key-set) the number necessary for connection with the called station.

10. Routes

The routes followed by international telephone traffic are designated by agreement between Administrations *. A distinction is made between:

— primary routes,
— secondary routes,
— emergency routes.

Primary routes: The circuits normally used in a given relation.

Secondary routes: The circuits to be used when the primary routes are congested, or when the transmission on the primary routes is not sufficiently good, or it is outside the normal hours of service on the primary routes.

The secondary route(s) may pass through the same countries as the primary routes or through different countries.

Emergency routes: The circuit or circuits to be used in case of complete interruption or major breakdown of the primary and secondary routes. The emergency routes may pass through any country.

11. Controlling exchange

1. In the manual or semi-automatic service the controlling exchange is responsible for setting up calls and, in advance preparation operating, it decides the order in which calls shall be connected.

2. The Administrations * concerned shall agree among themselves to designate the controlling exchange.

3. Generally speaking, they shall select for this purpose:

3.1 in demand operating:

a) the international exchange having access to the first outgoing international circuit;

3.2 in advance preparation operating:

a) when a single international circuit is used the outgoing international exchange operating the international circuit;

* or recognized private operating Agencies.

b) when two or more international circuits are used the international transit exchange designated by joint agreement of the Administrations * concerned.

Note. — It may be that the international circuits are not operated exclusively by operators at the international exchange where they end; operators at other international or national exchanges may also have access to them by means of an automatic transit device. In such circumstances these international or national exchanges must be treated as though they were a controlling exchange, as far as setting up calls is concerned.

12. Controlling operator

The controlling operator is the outgoing operator in the controlling exchange who operates the international circuit. The controlling position is the position used by the controlling operator.

Note. — However, it may happen that the outgoing international circuit is also operated by an operator in an international or even a national exchange. If this is so, the latter operator is considered as controlling operator.

13. Successive phases of a call

The characteristic instants in the successive phases of the setting-up of an international telephone call in the manual or semi-automatic service are distinguished as follows:

t_0 the caller has placed his request;

t_1 the controlling operator has received all of the call details;

t_2 the controlling operator has made the first attempt to set up the call;

t_3 the called number has replied or the caller has been informed why the call cannot be connected;

t_4 the called person (or called extension) has been obtained or the caller has been informed why the call cannot be connected (the instant is only significant for personal calls);

t_5 the end of the conversation, generally when the caller replaces the receiver;

t_6 disconnection, normally when the international circuit is released by the operator.

Note. — In automatic service it is in general difficult to define all the characteristic instants specified above, either because it is impossible to distinguish between them with accuracy or because of differences between the switching systems used. It is, however, possible to define the *total setting-up time* (see definition 18 hereafter).

14. Duration of a call (conversation time)

The interval between the instant the call is actually established between the calling and the called stations and the instant the calling station gives the clearing signal (or the instant when, although the caller has not replaced his receiver, the call is:

* or recognized private operating Agencies.

— in manual or semi-automatic service, officially cleared down by an operator,

— in fully automatic service, cleared down after some slight delay by the action of the called subscriber's clear-back signal).

The time interval between:

a) t_5–t_3 is the duration of a station call;

b) t_5–t_4 is the duration of a personal call.

15. Chargeable duration — charged duration

1. The time interval on which the charge for a call is based is called the chargeable duration.

2. The chargeable duration is equal to the duration of the call reduced in manual or semi-automatic service, if necessary, to make allowance for any interruptions or other difficulties which might have occurred during the call.

3. The duration of a call for which the charge is paid by the calling subscriber (or the called subscriber in the case of a collect call) is the chargeable duration rounded upwards;

In the case of manual or semi-automatic operation to:

a) either to a 3-minute charge, if the chargeable duration of the conversation is less than 3 minutes;

b) or to the whole number of minutes if the chargeable duration is greater than 3 minutes.

16. Holding time of an international circuit

The time interval t_6–t_2 during which the circuit is used is the holding time of the international circuit.

This interval includes in particular the call duration, the operating time and the time taken to exchange service information.

Note. — The term " operating time " is meant to cover the time taken both by operators and switching equipment.

17. Answering time of operators; request transmission time; delay time; setting-up times of an international call

1. At the outgoing international exchange, the *answering time of operators* is the interval between the end of the transmission of the calling signal and its answer by an operator at the distant international exchange.

At the incoming international exchange, the *answering time of operators* is the interval between the appearance of a calling signal on a position or group of positions at that exchange and its answer by an operator.

2. The *request transmission time* is the time interval t_1–t_0 taken in passing the call request to the controlling operator.

3. The time interval t_2–t_1 is the *delay* to which the call is subject at the controlling exchange.

The caller is generally informed of this delay.

4. The *setting-up time* of a station call is the time interval t_3–t_1.

The total setting-up time of a personal call is the time interval t_4–t_1.

These times include any delay at the outgoing international exchange.

18. Traffic carried (by a group of circuits or a group of switches)

18.1 *Amount of traffic carried*

The amount of traffic carried (by a group of circuits or a group of switches) during any period is the sum of the holding times expressed in hours.

18.2 *Traffic flow*

The traffic flow (on a group of circuits or a group of switches) equals the amount of traffic divided by the duration of the observation, provided that the period of observation and the holding times are expressed in the same time units. Traffic flow calculated in this way is expressed in *erlangs*.

19. Traffic offered (to a group of circuits or a group of switches)

It is necessary to distinguish between traffic offered and traffic carried. The traffic carried is only equal to the traffic offered if all calls are immediately handled (by the group of circuits or group of switches being measured) without any call being lost or delayed on account of congestion.

The flow of traffic offered, and of traffic carried, is expressed in *erlangs*. The amount of traffic offered and of traffic carried is expressed in *erlang-hours*.

20. Measurement of busy-hour traffic

20.1 *Busy hour (of a group of circuits, a group of switches, or an exchange, etc.)*

The busy hour is the uninterrupted period of 60 minutes for which the traffic is at the maximum.

Note. — It is usual for the period of the busy hour and the amount of traffic in the busy hour to vary from day to day. In order to obtain a representative traffic estimate, it is recommended that an average value should be calculated from the measurement of a sample, as described later.

It is possible to calculate an average traffic flow which is the mean of the traffic flows during the busy hours of the different days in the sample. An alternative method is to find the continuous 60-minute period when the average of the sample is the maximum and to obtain from this period the representative traffic. The following recommendations relating to the determination of the sample period [1] and of the mean (sometimes called " time consistent " busy-hour) apply particularly to the second method.

[1] See Recommendation E.500, " Measurement of traffic flow ".

20.2 *Mean busy hour (of a group of circuits, a group of switches, or an exchange, etc.)*

The mean busy hour is the uninterrupted period of 60 minutes for which the total traffic of a sample is the maximum.

Note. — If it is not known which 60-minute period constitutes the mean busy hour, a sample measurement taken over 10 days [1] should be sufficient to enable the position of the mean busy hour to be determined. As it is desirable to have a uniform method of analysing the statistics thus obtained, the following method is recommended for adoption in the international service, the observations being made over quarter-hourly periods:

— for a number of consecutive days the values observed for the same quarter of an hour each day are added together;

— the mean busy hour is then determined as being the four consecutive quarters which together give the largest sum of observed values.

21. Circuit usage for a group of international circuits (or an international circuit)

The percentage ratio between the sum of the holding times during a specified period equal to 60 consecutive minutes at least and the total length of that specified period.

In the case of a group of circuits, the circuit usage corresponds to the average traffic density *per circuit* during the specified period.

Note. — Unless otherwise indicated, circuit usage is based on the busy hour.

22. Percentage of call requests met

The expression is a percentage of the ratio $\frac{n}{N}$, where

N is the total number of call requests (see definition 2) in a specified time;

n is the number of these call requests that are followed by calls (see definition 1).

[1] See Recommendation E.500, "Measurement of traffic flow".

CHAPTER II

GENERAL

RECOMMENDATION E.110

ORGANIZATION OF THE INTERNATIONAL TELEPHONE NETWORK

1. *When there is preparation operating*, international traffic should be decentralized whenever circumstances justify it, by the creation of international exchanges in adequate numbers in the centre of the areas to be covered by the service, to reduce waiting times and any lengthening of routes.

2. *In the direct or indirect manual demand operating*, it would be well to concentrate international traffic in a few international exchanges where major groups of international circuits end, so that international circuits may be more efficiently used, and in view, too, of the linguistic knowledge demanded of international operators.

3. *With semi-automatic and automatic service*, it would also be well to concentrate international traffic in a few international exchanges, because of

— the high cost of the technical equipment required in incoming and outgoing international exchanges for this service;

— the linguistic knowledge required of operators, in the case of semi-automatic international service, and

— the need to provide automatic transit in certain exchanges (international routing plan).

RECOMMENDATION E.111

EXTENSION OF INTERNATIONAL TELEPHONE SERVICES

Application of that provision of the Telephone Regulations (Geneva Revision, 1958) which states that Administrations * shall endeavour to extend international telephone services to the whole of their territories might sometimes entail the establishment of calls leaving something to be desired from the point of view of transmission quality; it is therefore desirable:

1. to take no decision to create or extend a new relation unless such means are available as would provide satisfactory service.

2. to make the opening or extension of the relation dependent on the passing of satisfactory test calls.

* or recognized private operating Agencies.

RECOMMENDATION E.112

ARRANGEMENTS TO BE MADE FOR CONTROLLING THE TELEPHONE SERVICES BETWEEN TWO COUNTRIES

In controlling the organization of the telephone service in a given relation, Administrations might forgo the conclusion of formal agreements signed by the heads of Administrations, as there is no need for such agreement in relations where the provisions of the Telephone Regulations (Geneva Revision, 1958) are mutually and fully accepted. On the following major points agreement can be reached by correspondence:

— *Date on which the relation is to be opened.*

— *Means used to provide the connection:*

direct (transit) circuit;
passage through a transit exchange;
transit country or countries concerned.

— *Classes of call admitted* (List the classes of call and other media of communication i.e., phototelegraph calls, programme transmissions and television transmissions)

— *Information:* Exchange data required for routing calls.

— *Charging and accounting.*

RECOMMENDATION E.113

DIRECTORIES

The lay-out of directories is governed by considerations which may vary from country to country; however, it is desirable that such lists of subscribers should be capable of ready consultation by the Administrations * and/or subscribers of other countries.

The following general arrangements for the preparation of directories should therefore be adopted:

a) subscribers and public stations should be classified in well-defined subdivisions (networks, administrative areas, geographical zones). Each volume of the lists of subscribers could usefully contain a recapitulatory list of the subdivisions mentioned in the volume, or an equivalent chart;

b) names of each district should always be in alphabetical order; when several subscribers have the same names, they should be classified by their first names, or by the initials thereof;

* or recognized private operating Agencies.

c) it would be desirable, from the point of view of the international telephone service, that directories (especially those supplied to other Administrations and/or to subscribers of other countries *) should be composed in roman characters, particularly those relating to the names and addresses of subscribers;

d) the general information of the telephone service which is normally to be found at the beginning of the directories should preferably include the following information:

i) instructions for making an international telephone call;

ii) a list of the (main) international telephone services open to the public;

iii) the relevant charges.

RECOMMENDATION E.114

PROPOSED TELEPHONE REGULATIONS

Introduction

1. In accordance with Resolution No. 36 (Plenipotentiary Conference, Montreux, 1965), the IVth Plenary Assembly of the C.C.I.T.T. has approved, for submission to the next World Administrative Telegraph and Telephone Conference of the I.T.U., a draft text for Telephone Regulations. As this Administrative Conference may not take place before the Vth Plenary Assembly of the C.C.I.T.T., the opportunity exists to bring up to date this text—should the need arise—during the 1968-1972 period.

2. These new draft Telephone Regulations should be completed by an appendix concerning the " Payment of balances of accounts ", the study of which could not be completed independently of other world organizations by the C.C.I.T.T.

A. Proposed text for Telephone Regulations annexed to the International Telecommunication Convention

(....., 19..)

Article 1. — Purpose of the Telephone Regulations

1. The Telephone Regulations lay down the general principles to be observed in the international telephone service.

2. These Regulations shall apply regardless of the means of transmission used, so far as the Radio Regulations and the Additional Radio Regulations do not provide otherwise.

3. Administrations * shall determine by mutual agreement any provision relative to the international telephone service which is not contained in these Regulations; in reaching such agreement Administrations * should take account of the Recommendations of the C.C.I.T.T. It should be noted, however, that these Recommendations are not mandatory.

* or recognized private operating Agencies.

Article 2. — International system

4. All Administrations * shall promote the provision of telephone service on a world-wide scale and shall endeavour to extend the international service to their entire national network.

5. The Administrations * shall designate the exchanges in the territory they serve which are to be regarded as international exchanges.

6. The Administrations * shall co-operate in the setting up of the necessary circuits interconnecting the international exchanges.

7. Each intermediate Administration * shall co-operate with the terminal Administrations* in providing the international circuits and installations required in the territory which it serves.

8. Each Administration * shall maintain the circuits and installations used for the international telephone service to ensure the best possible quality of service.

9. The Administrations *shall determine by mutual agreement which routes are to be used; in reaching such agreements recognition shall be given to the right of the Administrations * to make the choice between the possibilities available for the routing of the outgoing traffic.

Article 3. — Services accorded to users

10. The Administrations * shall determine by mutual agreement the classes of calls, the special facilities and the special transmissions using telephone circuits, to be admitted in their reciprocal international telephone relations observing the provisions of Articles 39 and 40 of the Convention.

11. The Administrations * shall normally place international telephone type circuits at the exclusive disposal of users or groups of users, for an appropriate charge, in those relations where telephone-type circuits remain available after the needs of the public telephone service have been satisfied.

Article 4. — Operating methods

12. The Administrations * shall agree between themselves upon the operating methods best suited to the needs of the international relations which concern them, taking account of the conditions and the possibilities of operation.

Article 5. — Composition of accounting rates

13. The overall accounting rates shall be made up of terminal rates and any transit rates.

14. The Administrations * shall fix their terminal and transit rates.

15. However, they may by agreement fix the overall accounting rate applicable in a given relation and may divide that rate into terminal shares payable to the terminal countries, and where appropriate, into transit shares payable to the transit countries.

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* or recognized private operating Agency (or Agencies).

16. If no such special agreement is reached, the overall accounting rate shall be determined in accordance with paragraphs 13 and 14 above.

17. When an Administration * has acquired the right to utilize, by renting or by other arrangement, a part of the circuits and/or installations of another Administration *, the former shall fix the rate as mentioned in paragraphs 13 and 14 above for this part of the relation. In like manner, under the provisions of paragraph 15 above, the share of the overall accounting rate for this part accrues to the Administration * which has acquired the right to utilize the circuits and/or installations of another. The same provisions apply when several Administrations have jointly acquired the right to utilize a part of the circuits and/or installations of another Administration *.

Article 6. — Fixing of collection charges

18. Each Administration * shall, subject to the applicable provisions of national law, fix the charges to be collected from its public; in fixing these charges Administrations * should make every effort to avoid too large a dissymmetry between the charges applicable in each direction of the same relation.

19. The charge to the public should in principle be the same, in a given relation, regardless of the route used for setting up a call.

Article 7. — Accounting

20. Unless otherwise agreed upon, the Administration * responsible for collecting the charges shall establish a monthly account showing all the amounts owed and forward it to the Administrations * concerned.

21. The accounts shall be sent as promptly as possible but in any case before the end of the third month following that to which they relate.

22. In principle an account shall be considered as accepted without the need for specific notification of acceptance to the Administration * which sent it.

23. Nevertheless, any Administration * shall have the right to query the data in question during a period of two months after the receipt of the account only to the extent necessary to bring the differences within mutually agreed limits.

24. The payment of the balance due on an account shall not be delayed pending settlement of any query on that account.

25. Adjustments which are agreed shall be included in a subsequent account.

26. In relations where no specific agreements exist, a quarterly settlement statement showing the balances from the monthly accounts for the period to which it relates shall be prepared as quickly as possible by the creditor Administration * and be forwarded in duplicate to the debtor Administration * which, after verification, shall return one of the copies endorsed with its acceptance.

27. Payments shall be effected as promptly as possible but in no case later than six weeks after the day on which the quarterly settlement statement is received by the debtor Administration *. Beyond this period, the creditor Administration * shall have the right to charge interest at the rate of 6% per annum, reckoned from the day following the date of expiration of the said period.

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* or recognized private operating Agency (or Agencies).

B. Reasons for amendments to the Telephone Regulations

The numbers of articles and paragraphs in the revised text of the Regulations are given in parentheses beneath the corresponding numbers of the old Regulations.

Telephone Regulations

Chapter	*Article*	*Paragraph*	*Comments*
I	1 (1)		Retained with modifications.
		1 (1)	Text changed to limit the Telephone Regulations to general principles.
		2 (2)	Text changed to cover all means of transmission.
		3 (3)	(Revised, to establish the relationship between the Regulations and C.C.I.T.T. Recommendations.)
II	2	4, 5	Deleted. The necessary definitions to be included in the *List of Definitions of Essential Telecommunication Terms.*
III	3 (2)		Retained with modifications.
		6 (4) (8)	First sentence deleted as unnecessary. Reference to quality of conversation revised and relocated in paragraph 8 of proposed Regulations. Text changed to emphasize the importance of extending service world wide.
		7 (5) (6)	Minor drafting change. Paragraph added to emphasize need for co-operation in connecting international exchanges.
		8 (7)	Modified by new paragraph 7.
		9 (7)	Modified by new paragraph 7.
		10 (8)	Minor change in text.
		11 (9)	Modified with amplification.
		12	Deleted as unnecessary since it is now covered by Recommendation E.402.
		13 (8)	Deleted, principle included in paragraph 8 of proposed Regulations.
		14	Deleted as unnecessary detail in Regulations.
	4 (2)	15 (8)	Deleted as it appears in No. 8 of Article 2 of the draft revised Regulations, and details already included in C.C.I.T.T. Recommendation.

Chapter	*Article*	*Paragraph*	*Comments*
IV	5	16	Deleted, a national matter.
		17, 18	Deleted as unnecessary matter for bilateral agreement, becoming of minor importance as continuous working is becoming common.
		19, 20	Deleted as details already included in C.C.I.T.T. Recommendation.
	6	21, 22	Deleted as it is more appropriate as a C.C.I.T.T. Recommendation.
V	7	23, 24	Deleted as it is more appropriate as a C.C.I.T.T. Recommendation.
	8	25 to 28	Deleted as it is more appropriate as a C.C.I.T.T. Recommendation.
VI	9-13 (3)	29-55 (10)	Deleted entirely as all details are now included in the " Instructions for the International Telephone Service " (C.C.I.T.T. Recommendation E.140). A statement of general principle is incorporated in paragraph 10 of the new regulations.
VII	14 (4)	56 (12)	Text changed to reflect principle only.
VIII	15 to 18	57 to 71	Deleted as details are included in the " Instructions for the International Telephone Service " (C.C.I.T.T. Recommendation E.140).
IX	19-21	72-109	Deleted as details are included in the " Instructions for the International Telephone Service " (C.C.I.T.T. Recommendation E.140).
X	22	110-115	Deleted. General principles covered in paragraphs 10 and 11 of the new regulations.
	and		
XI	23, 24	116-119	Details to be included in C.C.I.T.T. Recommendation. The C.C.I.T.T. considers that the Telephone Regulations should be limited to the public telephone service (message telephone service). The C.C.I.T.T. considered whether certain basic principles concerning the lease of telephone circuits and the provision of programme transmissions needed to have the force of regulations. Its conclusion was to add, in Article 3, paragraph 11, of the proposed Regulations, a general principle establishing the priority of the public telephone service over the provision of telephone circuits for exclusive use.

Chapter	*Article*	*Paragraph*	*Comments*
XII	25	120-122	Deleted. General principle included in paragraph 10 of proposed Regulations. It is the opinion of the C.C.I.T.T. that provisions concerning only one type of usage of telephone circuits for purposes other than voice transmission are inappropriate. This is especially true in view of the developing usage being made of telephone circuits for data transmissions. Because of the evolutionary changes now taking place in this area it is recommended that details on these types of usage would best be incorporated in C.C.I.T.T. Recommendations. To ensure recognition in the Telephone Regulations of the use of telephone circuits for purposes other than voice transmission, the term " special transmissions " has been included in Article 3, paragraph 10, of the proposed Regulations.
XIII	26-39 (5, 6)	123-204 (13-19)	Deleted, replaced by new articles stating general principles on accounting rates and the fixing of collection charges. Other details are more appropriate for C.C.I.T.T. Recommendations. For further details, see below.
	26	123	Deleted, as more appropriately the subject of a C.C.I.T.T. Recommendation.
	(6)	124 (18)	Text changed to establish clearly the rights of the outgoing Administrations or recognized private operating Agencies to fix the charges to be collected from the public; the question of the " gold franc " is covered by the Convention.
		125-127	Deleted, as it is included in the " Instructions for the International Telephone Service " (C.C.I.T.T. Recommendation E.140).
	(6)	128 (19)	Retained with modification.
	(6)	129-130 (18)	Deleted, basic principle included in paragraph 18 of proposed Regulations.
	27 (5)	131-134 (13, 16)	Retained with minor textual changes.
		135-138	Deleted as it is included in a C.C.I.T.T. Recommendation.
	28 (6)	139-141 (18)	Deleted as the new paragraph 18 makes the fixing of a monetary equivalent unnecessary.
	29	142-144 (18)	Deleted as basic principle included in paragraph 18 of proposed Regulations.
	30	145, 146	Deleted as it is covered by a C.C.I.T.T. Recommendation.
	31	147, 148	Deleted as it is covered by a C.C.I.T.T. Recommendation.
	32	149-156	Deleted as it is covered by a C.C.I.T.T. Recommendation.
	33 to 37	157-202	Deleted as it is covered in the " Instructions for operating the International Telephone Service " (C.C.I.T.T. Recommendation E.140).
	38, 39	203, 204	Deleted as it is covered in C.C.I.T.T. Recommendation.

Chapter	*Article*	*Paragraph*	*Comments*
XIV	40-43 (7)	205-247 (20-27)	The provisions of this Chapter are considered to contain unnecessary detail and to need amendment to incorporate new methods. This chapter is deleted and replaced by Article 7 of the new regulations, which state the basic accounting principles. Other details will be covered by existing and proposed C.C.I.T.T. Recommendations.
XV	44	248	Final disposal of this paragraph will require a review of Article 138 of the Convention and the evaluation of the documents prescribed.
	45	249-250	Deleted, as it is covered by Article 14 of the Convention.
		251	Included in paragraph 3 of proposed Regulations.
XVI	46	252-254	This chapter is the responsibility of the Administrative Conference.
Annex		255-272	Deleted: the necessary definitions will be included in the *List of essential telecommunication terms*.
Appendix		273-291	See Introduction, paragraph 2, to the present Recommendation.
Resolutions Nos. 1 and 2, Recommendation, Opinions Nos. 1, 2 and 3			The contents of Opinion No. 1 should be reaffirmed by the next Administrative Telephone and Telegraph Conference. The Resolutions, Recommendation and other opinions may be regarded as no longer necessary.

RECOMMENDATION E.115

DEMAND OPERATING OF INTERNATIONAL CIRCUITS

In general, it is desirable in relations with manual operating to employ demand operating whenever possible.

Administrations * concerned should make every effort (by ensuring that there are sufficient circuits, installations, personnel) to use demand operating.

In relations operated with preparation (outgoing or advance preparation) of calls, the Administrations * concerned should make every effort to reduce delay as much as possible.

RECOMMENDATION E.116 [1]

ADVANTAGES OF SEMI-AUTOMATIC OPERATING IN THE INTERNATIONAL TELEPHONE SERVICE

For the following reasons the attention of Administrations * is drawn to the advantages of semi-automatic operating from the point of view of economy and the quality of service:

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* or recognized private operating Agencies.

[1] This Recommendation is, in substance, the same as Recommendation Q.5 in Volume VI of the *White Book*.

1. from the introduction of semi-automatic operating at the incoming exchange, large economies in personnel can be the result;

2. the number of faults due to the equipment used for the international semi-automatic operating is very small;

3. the " efficiency " (ratio of chargeable time to total holding time) of semi-automatic circuits is very high compared with the efficiency of manual circuits operated on a demand basis;

4. the quality of the service given to users owing to the reduction in the time of setting up a call is improving considerably;

5. any type of call can be set up without difficulty over semi-automatic circuits, so that semi-automatic circuits can be used exclusively on an international relation.

RECOMMENDATION E.117 [1]

ADVANTAGES OF INTERNATIONAL AUTOMATIC SERVICE

For the following reasons, the attention of Administrations * is drawn to the additional advantages resulting from the introduction of international automatic service:

1. the advantages of semi-automatic operating mentioned in Recommendation E.21 apply equally well to automatic service in respect of reliability, circuit efficiency and the satisfaction given to users;

2. the advantages of automatic service are even greater as regards staff economy, since outgoing operators are dispensed with;

3. the change-over from semi-automatic to automatic service may be done without any major modification of the international circuits or of the switching equipment at transit and incoming exchanges;

4. the above advantages have been widely confirmed by experience on a large number of international relations;

5. such experience has also shown that, when a relation changes from demand operating (manual or semi-automatic) to automatic service, there is a considerable increase in traffic;

6. the introduction of an international automatic service follows logically on the introduction of a national automatic service.

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* or recognized private operating Agencies.

[1] This Recommendation is, in substance, the same as Recommendation Q.6 in Volume VI of the *White Book*.

RECOMMENDATION E.118

DIVISION OF CIRCUITS INTO OUTGOING AND INCOMING CIRCUITS

From the operating point of view the assignment of the circuits of a relation into incoming and outgoing groups is such as to facilitate the work of the operators.

RECOMMENDATION E.119

INSTRUCTION OF STAFF OPERATING INTERNATIONAL POSITIONS

The professional instruction of operating and supervising staff is of the greatest importance in ensuring the efficient use of circuits in the international telephone service; to this end, it is extremely desirable to improve supervisors' and operators' knowledge of the language of other countries and to enable them to become informed about the customs of the subscribers, the organization of the service and the manipulation of equipment at the other end of the circuit.

It is therefore recommended:

1. that, during the training of these operators, they should be provided with some information about methods and operating procedures used in the countries with which they might be connected;

2. that there should be frequent exchanges of supervisors and operators between the telephone exchanges of different countries.

RECOMMENDATION E.120

MANUALLY-OPERATED INTERNATIONAL TRANSIT TRAFFIC

1. Direct circuits should be provided across transit countries whenever traffic justifies such a course; in this respect attention should be paid, for example, to the difficulties inherent in the use of an intermediate exchange for transit calls with manual operation.

2. In the absence of permanent direct routes, it is helpful to provide temporary direct circuits whenever a temporary traffic flow so justifies. As far as possible, such temporary direct circuits should not be set up via the operator's positions.

3. Whenever permanent or temporary direct circuits cannot be set up, the greatest possible degree of standardization in *the operating methods used in transit exchanges* is desirable.

The following instructions will then be applied:

3.1 if the two international circuits use manual demand operating, all the international transit exchange has to do is to make arrangements to set up the transit calls in accordance with the requests made by the outgoing international exchange, which means the controlling exchange;

3.2 when, on the other hand, preparation operating is in force on either of the two international circuits, the international transit exchange becomes the controlling exchange; and

3.2.1 the controlling operator at the international transit exchange is the operator serving the most congested route. If there is no delay on the circuits to be interconnected, or if this delay is equal in both directions, the controlling operator shall be designated by the international transit exchange;

3.2.2. the controlling operator shall determine the time when a transit call is set up according to its class and priority and the time when the call request is received by the international transit exchange;

3.2.3 the controlling operator shall warn her two counterparts in the international exchanges of the time when it is expected to set up the transit call or calls in question, so that the operators in these exchanges may prepare the required circuits;

3.3 in the exceptional case when the call requires more than two international circuits, the Administrations * concerned shall agree among themselves on the controlling exchange.

RECOMMENDATION E.121

SEMI-AUTOMATIC TRANSIT TRAFFIC

In the two cases mentioned hereafter it may be advantageous from a general economical point of view (taking into account the loss probability and cost) to route traffic by automatic transit exchanges:

Case 1

Where there is a light traffic load between two countries, it may be desirable to route this traffic through an automatic transit exchange, rather than to provide a small group of direct circuits.

The considerations normally apply to the case where the introduction of semi-automatic operation is considered, but they should be equally valid for traffic which terminates on a manual international trunk exchange, reached through an automatic transit exchange.

Note. — The purely economic point of view from which these conclusions are drawn excludes all other considerations, particularly the following:

a) It is necessary that the transit exchanges through which it is desired to route the traffic should be prepared to accept the transit traffic which would be offered to them, and Administrations* involved should design their circuit groups to satisfy the requirements of Part V in so far as loss probability is concerned.

b) The provision of direct circuits may be preferred to a routing entirely via a transit centre for other reasons, e.g. the provision of broadcast programme circuits, control circuits for these transmissions, voice-frequency telegraph circuits, etc.

* or recognized private operating Agencies.

Case 2

In certain cases, particularly where the traffic between two countries is heavy, and when, for instance, it may lead to the deferment of a new installation, it may be advantageous to route a certain proportion of the additional traffic (peak traffic) by way of a transit centre.

RECOMMENDATION E.122

ACCESS TO A TELEPHONE INFORMATION OPERATOR IN A FOREIGN COUNTRY

1. In the international *automatic* service:

1.1 A subscriber desiring to inquire about a subscriber's number, or to make any general telephone inquiry in another country, must appeal to a special service in his own country, which will obtain the information for him if it is not to hand.

1.2 Technical arrangements should, so far as practicable, bar access by a subscriber in a foreign country to an operator of the telephone information service of another country.

Note. — Though it is impossible to prevent subscribers having free access to information operators in a foreign country, there would generally be timing to clear down the call when no answer signal is forthcoming, and the access time to the information service would thus be automatically limited.

1.3 On no account should the numbers or codes giving access to the telephone information services in other countries be included in published dialling code information.

2. In the *semi-automatic* international service: Outgoing operators should be able to get in touch with the information services of foreign countries. It was considered advantageous, and even essential, where big countries were concerned, that an operator should be able to obtain information about subscribers' numbers from the source—that is to say, from any decentralized services there might happen to be in the foreign country, and not just from some single information bureau in that country.

Provision should be made for access to a centralized service in the country of destination, for the purpose of acquiring information about subscribers' numbers, even when direct access to decentralized information services is possible, since the outgoing operator might fear language difficulties, or may not know the number to dial to obtain the regional information service.

3. There are various possible ways whereby operators could be ensured access to the information operators in other countries, and whereby such access could be prohibited to subscribers:

3.1 Automatic calls might be distinguished from semi-automatic ones on arrival. Automatic calls to information services, characterized by the few number of digits in their call numbers, could be blocked.

3.2 Outgoing operators might be told to get in touch with information operators in a foreign country via incoming operators (so called Code 11 operators). Access to information services would then be blocked for all calls coming from international circuits.

RECOMMENDATION E.123

PRESENTATION OF ROUTING DATA

When semi-automatic or automatic service is initially introduced between two countries it is recommended that a routing document be prepared by each Administration * and an adequate number of copies exchanged. It seems important to keep such information up to date by exchanging data of the following types:

a) major routing changes involving existing routes and/or offices for which data have been previously supplied. Such information should be made available at least one month prior to the actual effective date of the change. In this consideration the importance of notification will be governed by the volume and characteristics of the traffic affected;

b) other routing changes in a country's networks which were not sufficiently important to be handled as described in a) above. This information should be supplied annually or more frequently when circumstances justify this course.

When forwarding routing changes under a and b, forms on the model of Tables A or B in section II should be used, indicating whether the change is a revision or a new addition. In principle, a complete reprinting of the routing document is desirable from time to time. However, the frequency of production of a revised set of routing information should be left to the discretion of the issuing Administration *, it being recommended that it should be not less frequent than once in five years.

It is recommended that the routing document should be prepared as a booklet of the size A5 (14.8 × 21.0 cm), and be divided into three sections.

Where an Administration * finds it impracticable to provide all of the routing data in the manner recommended above, it is desirable that it adhere to this Recommendation to the maximum extent possible.

Section I—Explanatory notes

1. The issuing Administration * should include the following items:

1.1 the numbering plan arrangements should be explained briefly, and the trunk prefix (if any) used in the national network should be quoted. Any useful information about the total number of digits in the national numbering system should be supplied;

* or recognized private operating Agency.

1.2 the country code;

1.3 language digits according to the availability of language assistance on incoming calls;

1.4 name(s) of international exchange(s) used for incoming traffic. In specifying the name of the international exchange it should be indicated if it serves for continental and/or intercontinental traffic. If there is more than one exchange an explanation should be given as to which part of the national network each exchange serves by quoting the digit(s) of the trunk code which are necessary for this purpose. Where there is no uniform system for all incoming traffic to a country, the explanatory notes should make clear the specific instructions proper to each outgoing country.

1.5 it should be explained how subscribers in other localities than those listed in section II can be reached (for instance by code 11).

1.6 a table showing how to reach special services such as:

— supervisor,
— delay operator
— transit calls,
— calls to/from ships,
— phototelegraph calls,
— collect calls,
— requests for information,
— personal calls for which word has been left at the called station;

1.7 if functions described in 1.6 above are performed on a decentralized basis, routing data will be indicated in section II, Tables A and B. It should be observed that if the outgoing operator does not speak any of the languages indicated, she should direct her call to the appropriate incoming international operator;

1.8 a table of public holidays when general business and financial institutions may be closed;

1.9 it is recommended that a specific address be provided by each Administration * to receive routing information and to handle questions regarding internal routing arrangements and enquiries about entries in the routing document.

Section II. — Instructions for preparing and using routing tables

The routing information considered appropriate for distribution to other Administrations * should be set out in a standard form for ease of interpretation and in sufficient detail to enable the controlling operator to set up a connection without recourse to the incoming international operator on more than 5% of the calls.

* or recognized private operating Agencies.

It is in the interests of Administrations * to ensure that adequate and accurate information is available to controlling operators in order that operating costs at both outgoing and incoming exchanges may be kept to the lowest figure commensurate with the cost of production and maintenance of the routing information.

It is recommended that the routing information should be produced in either of the forms shown below, i.e. Table A or Table B.

The country where uniform information is available throughout its territory for access to its operators handling:

a) the completion of inward calls and verifying station conditions,

b) verification of station conditions only, and

c) local telephone number information,

ordinarily would use Table A. The method of access to these particular services would be indicated in section I above and need not be repeated against the individual items in the routing schedule.

In the case where a country provides differing access points beyond its international exchange for any or all of the three categories a, b and c mentioned in the preceding paragraph would use Table B. The specific routing information to give access to the available point should be shown in sub-columns of column 3, headed respectively 3 a, 3 b and 3 c. Where no facility exists for a particular locality there should be no entry of any kind, thus indicating the need for the controlling operator to call the international incoming operator.

TABLE A

Name of locality	Routing code to reach subscribers	Routing code to reach operators	Directory
1	2	3	4

How to fill in Table A

Column 1 - Name of locality

This is the name of the community, e.g. city, town or village, which subscribers generally use to designate where their telephone service is provided.

Column 2 - Routing code to reach subscribers

The routing code (trunk code) used to reach telephones in the locality.

Column 3 - Routing code to reach operators

The routing code combined with a standardized operator code (see item 1.7 in explanatory notes) which permits reaching an operator performing a specific function for the locality.

* or recognized private operating Agencies.

Language indicator

In column 3, insert, using a letter code, the language(s) spoken by the local operators. If the language(s) are spoken by all operators serving the localities listed in column 1, an explanatory note keyed to column 3 would suffice for indicating the common language(s). An explanation of the code should be annexed.

Column 4 - Directory

Where applicable the reference number or letter which indicates the particular directory volume or section where the telephone numbers for the locality may be found.

TABLE B

Name of locality	Routing code to reach subscribers	Routing code to reach operators for			Directory
		completing calls and verifying station conditions	verifying station conditions only	requests for information	
1	2	3a	3b	3c	4

How to fill in Table B

Columns 1, 2 and 4

See under Table A.

Column 3 a

This column should contain the complete code that enables a controlling operator to gain access to an incoming operator who is in a position to extend the connection to the called number and verify the station conditions.

Column 3 b

This column should contain the complete code that enables a controlling operator to gain access to an operator who can verify the conditions on a called station, e.g. that the number is of a working line, that there is no reply or that the line is engaged.

Column 3 c

This column should contain the complete code that enables a controlling operator to obtain the subscriber number of a person in the locality *in question.*

As it is important that the controlling operator should know that she will be able to understand the called operator, an indicator should be used, as described on the paragraph language indicator of Table A. If separate routing codes are necessary to give access to operators speaking specific languages at the incoming exchange, these should be shown with the appropriate indication against each code. A routing code in column 3 a should not be repeated in column 3 b.

Section III - List of trunk (area) codes in numerical order

Column 1 — routing code,

Column 2 — with identifying name of section or area reached.

RECOMMENDATION E.124

CREDIT CARDS

1. Credit cards may be issued by Administrations * to allow a credit card customer to make telephone calls in the international service at the appropriate charges for each call and have the charges billed to his account in the country which issued the credit card. However, the international credit card system should only be used for calls to the country of issue.

2. The use of credit cards may be allowed for station and personal calls.

The use of a credit card does not change the rules for charging applicable to these types of calls.

3. If the holder of a credit card is to derive the maximum benefit from it, he should not be required to show the card at a telephone office; he should be able to make his calls over the telephone, simply quoting the card number to the operator. The number on the card should provide sufficient guarantee of the card's validity.

4. There would be certain advantages in standardizing the general format and numbering scheme together with usage procedures for credit cards used in the international service. This would facilitate the recognition of such cards in hotels, etc., and the handling of calls. It is a matter for national decision whether separate cards are issued for the national and the international telephone services, or whether one card will serve both purposes.

5. Credit cards issued for use in the international service (whether or not used for the national service as well) should, as far as practicable, conform with the following specifications:

Size

The credit card should be designed to fit easily into a wallet or bill-fold. Although bank-notes vary in size from one country to another, and this may affect the size of wallets and bill-folds, there seems so far to be a certain uniformity in the dimensions of the credit cards issued by various organizations: namely, about 9 cm × 5.7 cm (3½ × 2¼ inches), and it is suggested that any cards issued by Administrations * should have roughly these dimensions.

* or recognized private operating Agencies.

General format

When a separate card is issued for the international service, it should preferably bear the title " International Telephone Credit Card ". The term " International " must not, however, exclude use of the card within the country of issue.

When a card is issued for both the national and the international service, the issuing authority may prefer that the title of the card should simply be " Telephone Credit Card ".

The information on the card used in the international service should include:

1) country of issue and, where appropriate, the name of the Administration *;

2) holder's name and signature;

3) the card number (on a combined national/international card, the international number, if different, should be appropriately designated);

4) the date of expiry or, alternatively, the year of validity.

In addition, instructions on how the card should be used and on how a call should be requested may be given on the back of the card. However, some Administrations * may prefer to issue instructions separately, and to include, on the front or the back of the card, only the briefest instructions to prevent use by unauthorized persons if the card is lost.

Numbering system

For international purposes the credit card number will be composed of two parts:

the first part will consist of a code to indicate the country of issue followed by a letter denoting the year of validity;

the second part will consist of the credit card number assigned by the issuing Administration *.

To reduce the risk of error in passing credit card numbers over the telephone, they should be kept short and, as a general rule, should not exceed a total of twelve digits and letters, including the letter of validity.

To indicate the country of issue, the country codes given in Recommendation E.161 should be used.

The code letter to indicate the year of validity for the following year will be chosen by the Secretariat of the C.C.I.T.T. from an approved list of letters. Advice of the letter selected will be furnished to Administrations * by the end of August each year to allow time for cards to be printed and despatched to customers.

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* or recognized private operating Agency (or Agencies).

CHAPTER III

OPERATING METHODS

RECOMMENDATION E.140

INSTRUCTIONS FOR THE INTERNATIONAL TELEPHONE SERVICE

It has been noted that the rapid and reliable setting-up of international telephone calls demands perfect co-ordination of the operations effected by the operators involved; consequently, it is highly desirable to unify the rules for the utilization of circuits; unity can be obtained only by respecting the same operating rules.

It is therefore recommended that Administrations * should apply the *Instructions for the International Telephone Service* (Edition of 1 January 1969).

These Instructions should apply both to the continental and to the intercontinental telephone service. However, in intercontinental relations where the initial system (E.142) is applied, the Instructions are applicable so far as E.142 does not provide otherwise.

These Instructions should be regarded as an integral part of the present Recommendation, although they are contained in a separate publication.

RECOMMENDATION E.141

OPERATION OF INTERCONTINENTAL TELEPHONE SERVICES [INTRODUCTION TO RECOMMENDATION E.142 (INITIAL SYSTEM) AND E.143 (NEW SYSTEM)]

Two methods of operation are recommended by the C.C.I.T.T. for the intercontinental telephone service:

1. The first method of operation—known as the *initial system*—is the conventional operation of intercontinental telephone circuits in relations constituted by radiotelephone circuits and in particular the operation of radiotelephone circuits working on a part-time basis only. This method of operation forms the subject of Recommendation E.142 below, and corresponds to the operation in manual service only.

2. The second method of operation—known as the *new system*—is the operation of high stability circuits, that is essentially of submarine cable circuits, of radio-relay circuits and satellite circuits. This method of operation may, however, be applicable also to relations comprising a fair number of radiotelephone circuits or in which the radiotelephone circuits constitute only a part of all the circuits used in the relation considered. This new system covers, in particular, the case of semi-automatic and automatic intercontinental operation, while being equally compatible in manual operation. This second method of operation forms the subject of Recommendation E.143.

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* or recognized private operating Agencies.

RECOMMENDATION E.142

OPERATION OF INTERCONTINENTAL TELEPHONE SERVICES (INITIAL SYSTEM)

The following principles should be followed, as far as possible, by Administrations * in the operation of intercontinental services.

A. Classes of calls and facilities offered to the users

1. *Classes of calls*

Distress (emergency) calls
Government calls
Service calls
Private calls

are accepted in the intercontinental telephone services.

2. *Facilities offered to users*

Subscription calls
Multiple calls
Collect calls
Credit card calls

are accepted in the intercontinental telephone services by agreement between the Administrations * concerned.

3. For each of the classes of calls mentioned under 1 and 2 above there are two different types:

station-to-station calls, and
person-to-person calls.

4. " Station-to-station " calls are those to a specified subscriber's number.

5. a) " Person-to-person " calls are those to be exchanged between one specified person and another specified person, the required person being adequately designated. In some cases the search for this person may necessitate the despatch of a messenger if it has not been possible to obtain the person at any telephone station. The caller can also specify a substitute if the called person is not available.

b) On all " person-to-person " calls, the name of the person requesting the call is passed to the called person unless the caller has specified that he does not wish this to be done.

* or recognized private operating Agencies.

B. Call request

1. In principle, all call requests should remain valid so long as they have not been connected, refused by the called person or cancelled by the caller.

2. The person requesting an intercontinental call should be allowed to specify the time at which the call is to be established, it being understood that the call will be set up as near to that time as traffic and other conditions permit.

3. The person requesting an intercontinental call may modify the booking provided he has not been advised that the call is about to take place.

C. Establishment of calls

1. In each intercontinental telephone relation, the Administrations * concerned arrange by common agreement the " primary route " and, if possible, one or more " secondary routes ", taking into account such factors as hours of service, charges, etc.

2. The " primary route ", which may follow more than one itinerary, is that which should normally be used for the establishment of calls, except in the case of traffic congestion, or when transmission on this route is not of sufficiently good quality or when it is outside the normal hours of service on this route.

3. The " secondary routes " are used when the primary route cannot be used. They should be used in the order pre-arranged by the Administrations * concerned. If a call has been prepared over a secondary route because the primary route was not available, the call should be completed over the secondary route and not transferred to the primary route when it becomes available, unless there are compelling reasons to the contrary.

4. The charge in a given relation is the same, whether the primary or a secondary route is concerned.

D. Controlling exchange

1. When a call uses several intercontinental circuits, the Administrations * concerned agree among themselves to designate the " controlling exchange " responsible for placing call requests in the order in which they should be dealt with.

E. Timing of intercontinental calls

1. The exchange on the originating side of the first intercontinental circuit in the chain of connections should be responsible for fixing the chargeable duration of the call. However, collect and/or credit card calls may be timed at the incoming end by agreement between the Administrations * concerned.

2. On calls extended over European circuits, timing should normally be carried out by the exchange at the outgoing end of the intercontinental circuit.

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* or recognized private operating Agencies.

F. CHARGING FOR INTERCONTINENTAL CALLS

1. *Calls over direct intercontinental circuits* (See Remark 1 at the end of this Recommendation)

a) Charges for calls should be fixed by agreement between the Administrations * concerned.

b) Charges for person-to-person and station-to-station calls should be the same.

c) Reduced charges can be applied for subscription calls or for calls made during specified hours each day or on specified days each week, by agreement between the Administrations * concerned.

2. *Calls over a chain of intercontinental circuits* (See Remark 2 at the end of this Recommendation)

The charge for a call established over a chain of circuits should not exceed the sum of the charges for calls over each individual circuit. However, the Administrations * concerned may agree to fix a total charge less than the sum of the charges.

3. *Calls extended over European landlines* (that is, using them as an intermediate section or as an extension of an intercontinental circuit)

a) The principles for the determination of charges are the same as in 2, except that European countries operating a radio telephone circuit may agree to forgo any quota for the terminal section of their landline used to extend calls over intercontinental circuits.

Administrations * concerned in the provision of the landline section should not ask for higher payment than that applying in the case of a call obtained entirely by landline.

b) Where the application of the above principles would result in different charges for calls over different routes in a given relation, the Administrations * concerned with the operation of the most expensive route (or routes) should agree how the rate should be scaled down to the lower figure. Unless otherwise decided by agreement between the Administrations * concerned, this should be done by a proportional reduction in the hypothetical quotas applicable to the most expensive route or routes.

4. *Charges for ineffective calls (report charges)*

a) The report charge, which is never collected in addition to the call charge in the intercontinental telephone services, is mainly used as a means of discouraging an intercontinental call booking from being made, for example, merely to find out the whereabouts of a particular person without any intention of exchanging conversation, or to obtain other information by using a code pre-arranged with this particular person.

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* or recognized private operating Agencies.

b) No report charge is applicable to ineffective station-to-station calls, except in the case covered by point 4 e) hereafter.

c) A report charge is applicable to ineffective person-to-person calls if either the caller or the called person is responsible for the failure to establish the call, provided that the telephone service has been able to reach the called station. In principle, therefore, a report charge would be applicable in the following circumstances:

i) If, after the called station has been reached, the call is ineffective because the called person refuses the call or cannot be obtained despite several attempts.

ii) If, after the called person has been obtained, the call is ineffective because the caller refuses the call or cannot be obtained. The charge may also be applicable if no reply can be received from the calling station after several attempts, the called station having been already advised to expect the call.

iii) If, in the case of a deferred call, either the caller or the called person does not reply at the agreed time.

iv) If, in the case of a call destined to a person who is not a telephone subscriber, he does not present himself at the telephone, although arrangements have been made to advise him.

d) The amount of the report charge should be fixed by agreement between the Administrations * concerned. The amount should be uniform in any one relation, whatever the route used. The report charge should constitute a fixed percentage, in principle 10 % of the unit charge in the relation considered.

e) If the call request is to a wrong number and is established with the station having that number, no report charge shall be collected for the call if the incorrect request is *immediately* replaced by another request to the same country.

If the incorrect request is not followed by another request to the same country, the report charge is to be collected.

5. *Reduced charges*

a) Administrations * concerned may agree to apply reduced charges in respect of subscription calls, or in respect of calls made during mutually agreed periods.

b) Where it is agreed that subscription calls can be accepted, the following principles might apply:

i) Service should be given by contract for a minimum period of one calendar month.

ii) Calls should be contracted for daily or on six days per week, the same day each week being excluded.

iii) Calls should be contracted for in indivisible periods of five minutes, subject to a minimum period of ten minutes.

* or recognized private operating Agencies.

iv) The daily charge per call should be not less than two-thirds of the rate applied to non-subscription calls in the charge period concerned; for a monthly contract, the monthly charge should be 30 times the daily rate if the calls are required on each day, or 26 times the daily rate if calls are required on six days a week.

v) If traffic conditions permit, individual calls can be extended beyond the contract period at the rate applied to non-subscription calls.

vi) If a call is not established for service reasons within ..... minutes of the required time, a rebate of charge will be given, or the caller will be allowed to make the call at some other time in the same charge period.

c) If it is agreed that reduced rates shall be applied during specified hours daily or on specified days each week, the reduction in charge shall be of the order of 25%.

G. Division of charges for intercontinental calls

(See Remark 3 at the end of this Recommendation)

1. Charges for calls over direct circuits should in principle be divided equally between the terminal Administrations * unless other arrangements are agreed between them.

2. Charges for calls over a chain of intercontinental circuits should in principle be apportioned between the individual circuits in proportion to the charges for direct calls over each circuit. The amounts accruing to each circuit should then be divided equally between the terminal Administrations * unless other arrangements are agreed between them.

3. Charges for intercontinental calls extended over continental landline circuits should in principle be divided as follows:

a) the section of the charge accruing to the intercontinental circuit (or circuits) should be divided as indicated in 1 and 2 above;

b) the section of the charge accruing to the continental landline should be divided in proportion to the amounts required by each Administration * concerned in the provision of the landline.

H. Leasing of transmitters or receivers

1. There are no objections in principle to the lease of transmitters or receivers to users interested only in sending or receiving spoken messages of pictures, provided of course that such arrangements are compatible with the responsibilities which Administrations * have accepted by their adherence to the International Telecommunication Convention and associated Regulations.

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* or recognized private operating Agency (or Agencies).

2. Charges for the lease of such equipment should be determined by the Administration * concerned and they would not appear in international accounts.

3. Conditions to be met by lessees of transmitters or receivers should in principle be as follows:

a) The radio communications in question must not contain any advertisement or message of a private character.

b) Names and addresses of senders and intended recipients must be made known to all Administrations *, each one of which shall decide, in respect of recipients in its own territory, whether or not to permit participation. Any alterations should also be notified promptly.

c) The Administrations * concerned shall take all practicable steps to ensure that communications shall only be used by authorized recipients and that the provisions of the Convention as regards secrecy of telecommunications are observed.

d) Transmissions shall be at fixed times and, in the case of spoken messages, in prearranged languages.

e) Such other conditions as may be required by national law.

4. Where the lease of a transmitter in one country and a receiver in another country is required to provide a unidirectional circuit, or even where a multi-destination service is envisaged, Administrations * concerned, although retaining the right to determine the charges for equipment leased in their own country, may nevertheless, if they think it desirable, consult with each other in order to ensure that overall charges do not prejudice public service tariff scales.

I. Accounting

1. In principle, accounts should be prepared by the Administration * at the originating end of the intercontinental circuit (or of the first circuit of a chain of such circuits). That Administration * should pass on to the next Administration * all credits due to the second and subsequent countries. The second Administration * should take the necessary measures to credit the other Administrations * concerned.

2. In respect of traffic extended over European landline circuits, the European terminal of the intercontinental circuit will distribute credits in respect of calls incoming to Europe. In respect of calls originating in Europe, unless there is special agreement between the Administrations * concerned, the Administration * of the European country of origin will distribute the credits due to the European transit countries, if any, and to the European terminal of the intercontinental link.

3. In principle, accounts should be prepared and distributed by the first Administration * in the accounting chain (see above), if possible by the end of the first month and certainly not later than the end of the second month following that to which the account relates.

* or recognized private operating Agency (or Agencies).

REMARKS

Remark 1 (see section F.1)

Informatory note relating to the charges applied in the intercontinental telephone service by the American Telephone and Telegraph Company. — Standard of charges to be applied for terminal services.

The charge is based on the direct distance between the " charge zones " which are defined approximately; the charge is independent of the routing of the call.

The world is divided into " charge zones " determined by the intersection of the lines of latitude and longitude spaced at ten degrees.

In general each country, state, province (or similar political subdivision) is attached to a single charge zone. Of course the majority of countries do not lie entirely within the interior of a single charge zone and in such cases the charge zone chosen is generally that in which the greater part of the country lies, or the larger proportion of the population, or the part of the country where the telephone service is most developed.

By an accepted mathematical formula, great circle distances between the centres of the charge zones have been calculated and these distances are taken as the basis of charge.

Using:

1. the table below giving the basic tariffs, and
2. the distances (for charging) calculated according to the principle indicated above,

the charges applicable between any two charge zones placed respectively at each extremity of the intercontinental telephone circuit concerned can easily be determined.

Distances in miles (1 mile = 1609 metres)	Charge corresponding to the first three chargeable minutes (three charge units)	
	Weekdays (U.S. dollars)	Nights and Sundays (U.S. dollars)
0 to 500	4.50	3.75
501 to 1000	6.00	4.50
1001 to 2000	7.50	6.00
2001 to 3000	9.00	7.50
more than 3000	12.00	9.00

However, in some cases, the use of the table of charges above would have resulted in an increase over those previously applied. In such cases, this table is not applied rigorously and the present rates have been maintained in order to avoid such increases. In several other cases it may be desirable to employ a level of charges higher or lower than the nearest, in order to maintain the charges in agreement with those which are applied to neighbouring countries having a large community of interest.

Remark 2 (see section F.2)

Charges for calls routed over more than one intercontinental telephone circuit, applied by the American Telephone and Telegraph Company.

When service is provided by the interconnection of two circuits the charge, if made up of the sum of the charges applicable to terminal service over each of the circuits, would seem too high to attract users.

Therefore, the charge is established without regard to the use of two circuits and is divided at the *prorata* of the charges for terminal service.

For example, if the charge applicable under the procedures of Remark 1 is 12 dollars and the charge applicable to terminal service is 12 dollars over one circuit and 9 dollars over the other, the first circuit would receive 12/21 and the second circuit 9/21 of the 12-dollar charge.

Remark 3 (see section G.1)

Certain large countries claim token landline quotas in respect of calls extended to places at considerable distance from the intercontinental circuit terminal, before division of the balance of revenue.

RECOMMENDATION E.143

OPERATION OF INTERCONTINENTAL TELEPHONE SERVICES (NEW SYSTEM)

The following principles should be followed as far as possible by Administrations * in the new system to be adopted for the operation of intercontinental services (see definition of the " new system " in Recommendation E.141). Details concerning the application of these principles are to be found in the *Instructions for the international telephone service.*

A. Classes of calls and facilities offered to users

1. *Classes of calls*

Distress (emergency) calls
Government calls
Service calls
Private calls

are accepted in the intercontinental telephone services.

2. *Facilities offered to users*

Station calls
Personal calls
Collect calls
Credit-card calls
Multiple calls and requests for information

are accepted in the intercontinental telephone service by agreement between the Administrations concerned.

3. Station call is a call to a specified telephone number.

4. A personal call is a call between the number of a caller who may give his name (or the number of an extension) and some specific person (or extension); the person required must be adequately described (by name, position, address, etc.).

* or recognized private operating Agency (or Agencies).

If the Administration * of destination admits such a possibility, a messenger may be sent if it has been impossible to find the person desired by telephone.

B. CHARGING FOR INTERCONTINENTAL CALLS

1. The unit charge for a particular intercontinental service is the charge for an ordinary private station call of one minute duration, set up during the period of heavy traffic. The minimum charge for a call in manual or semi-automatic operating is three charge units.

The unit charge is always the same, whatever the route (primary, secondary or emergency) used between any two countries.

2. The charge for a call established over a chain of circuits should not exceed the sum of the charges for calls over each individual circuit (see Remark 1 at the end of this Recommendation). However, the Administrations * concerned may agree to fix a total unit charge less than the sum of the charges.

3. Subject to agreement between Administrations *, two different rates may be applied to traffic exchanged over their mutual routes :

— one rate during the period of " heavy " traffic;

— the other rate during the period of " light " traffic.

4. The charge for a personal call is the same as that for a station call in the same class, with the same priority and of the same duration, exchanged during the same charge period, plus a special charge for personal calls fixed by agreement between the Administrations concerned.

5. Both personal and station calls may be accepted as collect calls or credit-card calls.

6. Personal collect calls and personal credit-card calls are subject only to the special charge for personal calls.

7. Station credit-card calls are not subject to any additional charge.

8. Station-collect calls may be subject to a special charge[1] to be fixed by agreement between the Administrations concerned.

9. *Principles for application of charges*

9.1 When the call requested has been set up, the appropriate charge is payable. When the call requested has not been set up, no charge is payable.

9.2 In the case of a request for a station call, the call is set up when the two stations are interconnected.

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* or recognized private operating Agency (or Agencies).

[1] In certain European countries the special charge for station-collect calls levied by Administrations is equal to the charge for two minutes of conversation.

9.3 In the case of a request for a personal call, the call is set up when the caller is interconnected with the called party.

C. Division of charges for intercontinental calls

(see Remark at the end of this Recommendation)

1. Charges for calls over direct circuits should in principle be divided equally between the terminal Administrations * unless other arrangements are agreed between them.

2. Charges for calls over a chain of intercontinental circuits should in principle be apportioned between the individual circuits in proportion to the charges for direct calls over each circuit. The amounts accruing to each circuit should then be divided equally between the terminal Administrations * unless other arrangements are agreed between them.

3. Charges for intercontinental calls extended over continental landline circuits should in principle be divided as follows:

a) the part of the charge accruing to the intercontinental circuit (or circuits) should be divided as indicated in 1 and 2 above;

b) the part of the charge accruing to the continental landline should be divided in proportion to the amounts required by each Administration * concerned in the provision of the landline.

D. Accounting

1. In principle, accounts should be prepared by the Administration * at the originating end of the intercontinental circuit (or of the first circuit of a chain of such circuits). The Administrations * should pass on to the next Administration * all credits due to the second and subsequent countries. The second Administration * should take the necessary measures to credit the other Administrations * concerned.

2. In respect of traffic extended over European landline circuits, the European terminal of the intercontinental circuit will distribute credits in respect of calls incoming to Europe. In respect of calls originating in Europe, unless there is special agreement between the Administrations * concerned, the Administration * of the European country of origin will distribute the credits due to the European transit countries, if any, and to the European terminal of the intercontinental link.

3. In principle, accounts should be prepared and distributed by the first Administration * in the accounting chain (see above), if possible by the end of the first month, and certainly not later than the end of the second month following that to which the account relates.

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* or recognized private operating Agency (or Agencies).

Remark (see section C)

Certain large countries claim token landline quotas in respect of calls extended to places at considerable distances from the intercontinental circuit terminal, before division of the balance of revenue.

RECOMMENDATION E.144

TIME-TO-ANSWER BY OPERATORS

1. Quick answering by operators to calls made over international circuits is essential for a rapid and satisfactory telephone service and for the efficient use of such circuits.

2. To this end, a sufficient number of operators should be provided, and they should co-operate with one another, so that the answering time does not exceed 5 seconds for 80% of calls during the day period.

3. These provisions apply to both the manual and semi-automatic service for incoming operators and for delay operators.

4. With the semi-automatic service, the time-to-answer by assistance operators should be shorter than the time-to-answer by incoming operators. The objective to be aimed at is an answer in less than 5 seconds for 80% of calls at busy-hours. To this end, operators playing the double role of assistance and incoming operators should give priority to answering assistance calls.

5. The time-to-answer for incoming operators in the semi-automatic operating, that is:

— code 11 operators,

— code 12 operators (operators at the incoming exchange called by the outgoing exchange to record particulars of calls which have been found difficult to set up),

should, accordingly, be the time-to-answer shown in this Recommendation.

Regular code 12 operators at the outgoing exchange (regular operators recalled by the incoming exchange operators, when the latter have been successful in obtaining the called subscriber) cannot, of course, be obtained until they are free.

Volume II-A **Volume VI**

PART I PART II

CHAPTER IV CHAPTER II

NUMBERING PLAN AND DIALLING PROCEDURES IN INTERNATIONAL SERVICE

RECOMMENDATION E.160 RECOMMENDATION Q.10

DEFINITIONS RELATING TO NATIONAL AND INTERNATIONAL NUMBERING PLANS

1. International prefix

The combination of digits to be dialled by a calling subscriber making a call to a subscriber in another country, to obtain access to the automatic outgoing international equipment.

Examples:

00 in Switzerland
91 in Belgium

Note. — a) In some countries two or more international prefixes may be used:

— to reach different groups of countries;

— to obtain different classes of call (e.g. station call or personal call).

In the first case the use of two or more international prefixes allows the use of different groups of switching equipment and the use of " abbreviated " dialling (i.e. shorter country codes) for the calls to a defined group of countries (see definition No. 2. Country code).

b) Where several countries are included in one integrated numbering plan, the international prefix is not used on a call from one of these countries to another.

2. Country code

The combination of one, two or three digits characterizing the called country.

Examples:

7 U.S.S.R.
54 Argentina
591 Bolivia

Notes. — a) In the case where a country uses different international prefixes abbreviated dialling can be used. In this case, for calls to one country of a defined group of countries, a regional country code, composed of fewer digits than the normal country code, may be used.

Examples:

For traffic between Latin American countries, the following regional country codes might be used:

1 Argentina
2 Brazil
3 Chile
etc.

b) In the case where several countries are included in one integrated numbering plan, no country code need be dialled for the traffic from one of these countries to another. For access by other countries, these countries:

— may be included under one common country code, or

— may have separate country codes,

always keeping in mind the necessity to avoid exceeding the recommended maximum number of digits in the international number.

3. Trunk prefix

A digit or combination of digits to be dialled by a calling subscriber, making a call to a subscriber in his own country but outside his own numbering area. It provides access to the automatic outgoing trunk equipment.

Examples:

0 in Belgium, Italy, Japan, Netherlands, Switzerland, United Kingdom
1 and 0 in Canada and in the U.S.A.
9 in Finland and Spain
16 in France

Note. — In the case where several countries are included in one integrated numbering plan, the trunk prefix is also used for calls from one of these countries to another.

4. Trunk code

A digit or combination of digits (not including the trunk prefix) characterizing the called numbering area within a country (or group of countries, included in one integrated numbering plan).

The trunk code has to be dialled before the called subscriber's number where the calling and called subscribers are in different numbering areas.

The trunk code varies from one country to another and is composed of:

a) either a " regional code " indicating the geographical zone to which the called subscriber belongs and within which subscribers can call one another by their subscriber numbers.

Example:

In France:

Paris area(Departments of Seine, Yvelines, Seine-et-Marne, Oise, etc.): trunk code 1,
Nice area (Department of Alpes-Maritimes): trunk code 93;

In Belgium:

Brussels area: trunk code 2,
Namur area: trunk code 81;

In the Federal German Republic and the Netherlands:

the geographical area defined above corresponds in general to the local network.
Düsseldorf local network: trunk code 211,
Amsterdam local network: trunk code 20;

In the United Kingdom:

this definition applies to certain networks such as that of London, the trunk code for which is: 1;

In Canada and the U.S.A.:

The geographical area defined above corresponds to a " Numbering Plan Area " (NPA)
Montreal area: NPA code: 514,
New York City area: NPA code: 212;

b) or a " numbering area code " followed by an exchange code when the directory entry of the called subscriber does not include the exchange code;

Example:

in certain areas of the United Kingdom:
Truro (group centre): trunk code 872
Perranporth (in the Truro group): trunk code 872 57

5. Subscriber number [1]

The number to be dialled or called to reach a subscriber in the same local network or numbering area.

This number is the one usually listed in the directory against the name of the subscriber.

6. National (significant) number

The number to be dialled following the trunk prefix to obtain a subscriber in the same country (or group of countries, included in one integrated numbering plan) but outside the same local network or numbering area.

The national (significant) number consists of the trunk code followed by the subscriber number.

It should be noted that, in some countries, it is customary to consider *for national purposes* that the trunk prefix is included in the national number (which is then not the national (significant) number). A careful distinction must therefore be made between such national definition or practice and the C.C.I.T.T. definition, which is internationally valid. In order to avoid misunderstanding, the C.C.I.T.T. definition includes the word " significant " between brackets, reading as follows: " national (significant) number ".

[1] Care should be taken not to use the term " local number " instead of " subscriber number ".

Examples:

Subscriber	National (significant) number
12 34 56 in Brussels	2 12 34 56
12 34 56 in Düsseldorf	211 12 34 56
21 34 56 in Nice	93 21 34 56
870 12 34 in Montreal	514 870 12 34
12 34 in Perranporth	872 57 12 34
248 45 67 in London	1 248 45 67

Note. — Where several countries are included in one integrated numbering plan, only the national (significant) number is to be dialled after the trunk prefix on calls from one of these countries to another.

7. International number

The number to be dialled following the international prefix to obtain a subscriber in another country.

The international number consists of the country code of the required country followed by the national (significant) number of the called subscriber.

Examples:

Subscriber	International number
12 34 56 in Brussels	32 2 12 34 56
12 34 56 in Düsseldorf	49 211 12 34 56
21 34 56 in Nice	33 93 21 34 56
870 12 34 in Montreal	1 514 870 12 34
12 34 in Perranporth	44 872 57 12 34
248 45 67 in London	44 1 248 45 67

Note. — Where several countries are included in one integrated numbering plan, the international number is not used on calls from one of these countries to another. (See the note to definition No. 6.)

RECOMMENDATION E.161 RECOMMENDATION Q.11

NUMBERING FOR INTERNATIONAL SERVICE

1. National numbering plan

1.1 Each telephone Administration should give the most careful consideration to the preparation of a *national numbering plan* [1] for its own network. This plan should be designed so that a subscriber is always called by the same number in the trunk service. It should be applicable to all incoming international calls.

1.2 *Number analysis*

1.2.1 The national numbering plan of a country should be such that an analysis of a minimum number of digits of the national (significant) number [2] :

[1] See the C.C.I.T.T. *Manual on National Telephone Networks for the Automatic Service* for a comprehensive study of national numbering plans from the national point of view.

[2] See definitions in Recommendations E.160 and Q.10.

a) gives the most economical routing of incoming international traffic from various other countries;

b) indicates the charging area in those countries where there are several.

1.2.2 In the case of a country with a two- or three-digit country code, not more than twe digits of the national (significant) number should be analysed for these purposes.

In the case of a country with a one-digit country code, not more than three digits of the national (significant) number should be analysed for these purposes.

1.2.3 In the case where an integrated numbering plan covers a group of countries the digit analysis specified in 1.2.2 should also determine the country of destination.

1.2.4 For the requirements relating to frontier traffic see Recommendations E.280 and Q.50, paragraph 3.

2. Limitation of the number of digits to be dialled by subscribers

2.1 *International number*

The C.C.I.T.T. recommended in 1964 that the number of digits to be dialled by subscribers in the automatic international service should not be more than 12 (excluding the international prefix). It is emphasized that this is the maximum number of digits and Administrations are invited to do their utmost to limit the digits to be dialled to the smallest possible number.

2.2 *National (significant) number*

Noting that:

a) the international number (excluding the international prefix) consists of the country code followed by the national (significant) number,

b) the smallest possible number of digits to be dialled in the automatic international service is achieved by limiting the number of digits of the country code and/or of the national (significant) number,

c) in some countries where telephony is already developed to an advanced stage, the national numbering plans in force enable the number of digits of the international number to be limited to less than 12,

d) some other countries which drew up their national numbering plans some time ago have taken steps to ensure that the number of digits of the international number will not exceed 12 and may even be less,

the C.C.I.T.T. recommended in 1964 that countries which had not yet established their national numbering plan ensure that, as far as practicable, the maximum number of digits of the international number be 11, at least for a period corresponding approximately to the life of automatic switching equipment (i.e. a minimum of 25 years).

For these countries, the number of digits of the national (significant) number should be equal to a maximum of 11–*n* (at least for the period of consideration), *n* being the number of digits of the country code.

3. Digit capacity of international registers

The C.C.I.T.T. considers it advisable to recommend that the digit capacity of registers dealing with international traffic should allow for future conditions that may arise, but not possible to specify at the present time. In this regard, registers dealing with international traffic should have a digit capacity, or a capacity that can be expanded, to cater for more than the maximum 12-digit international number envisaged at present. The increase in the number of digits above 12 is left as a matter of decision to be taken by individual Administrations *.

4. Use of figures and letters in telephone numbers

4.1 For automatic international service, it is preferable that the national numbering plan should not involve the use of letters (associated with figures). The use of letters in national numbering plans may, however, be necessary for national reasons. For example, countries using letters in their subscriber numbers will naturally use them in their national numbering.

4.2 For automatic international service to countries using letters in telephone numbers, it would be helpful, in a country where letters are not used:

a) to include in the directory a table for converting into figures the letter codes of exchanges in countries with which an automatic service is available;

b) to supply, at the time of opening this automatic service, a booklet of instructions containing the conversion table to the main subscribers to the international service;

4.3 It would also be desirable, in countries with letters in the telephone numbers, that subscribers with considerable international traffic should be asked to show on their letter-heads, next to their telephone number, the international number with figures only. (See general recommendation for letter-heads in 7.3.2.)

5. Rotary dials (see Figure 1)

5.1 For countries which have not yet adopted any specific type of dial, the figures on the dial should be arranged in the following order: 1, 2, 3, ..., 0.

5.2 The dial shown below uses the arrangement of letters and figures employed by some European Administrations. It may be convenient that the dials (or key-sets) used by international operators for semi-automatic operating in Europe have this arrangement of letters and figures.

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* or recognized private operating Agencies.

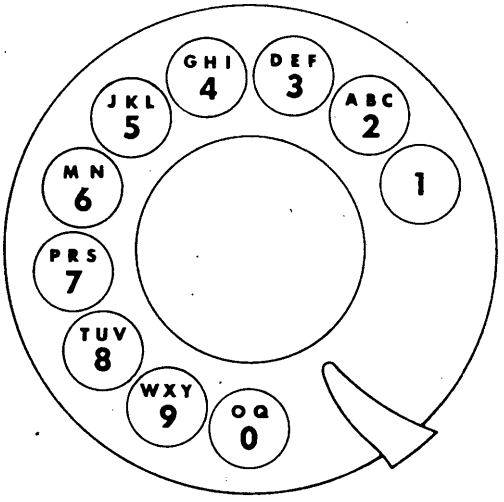
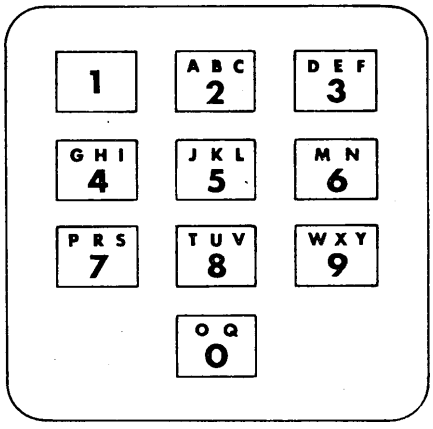


FIGURE 1



C.C.I.T.T. 637A

FIGURE 2

6. Push-button telephone sets (see Fig. 2)

On the North-American keysets, the digit 0 is not associated with letters O and Q but with the word "operator", the letter O being associated with digit 6.

6.1 *Arrangement of the push-buttons*

The following arrangement of push-buttons corresponding to the digits 0 to 9 is recommended:

1 2 3
4 5 6
7 8 9
0

This arrangement, which corresponds to that already adopted in some countries—and on which a certain number of Administrations have based their standardization—is one found suitable, for a maximum of 12 buttons. This recommendation results from thorough studies made by several Administrations on subscriber reactions to various conceivable push-button patterns.

In view of the fact that purely numerical numbering plans are now recommended and that the association of letters to digits is not the same in different countries, it is undesirable to standardize letter symbols for the push-buttons corresponding to each of the digits. In cases where a mixed letter-and-digit dialling system is still in use in a country, the letters associated with the figures in the dialling system of the country concerned may, of course, be included on the corresponding push-buttons of their country's telephone sets.

6.2 *Additional push-buttons*

The push-button corresponding to the zero in the last line of the arrangement shown above may be flanked by two additional buttons, thus making a pattern with 4 horizontal rows of 3 buttons each.

The functions and designations of the additional buttons cannot yet be defined. Their use may depend on the possibilities offered by the network of the country concerned. For example, a button may be used to permit:

— abbreviated dialling of a select list of subscriber numbers,

— transfer of a call to another subscriber in the same network,

— obtaining conference calls in which several users take part together,

— etc.

Apart from this, various other functions can be conceived for the additional buttons.

7. Prefixes and codes

7.1 *International prefix* [1]

International standardization of a code for access to the international network for automatic international operation has not been possible since it was in conflict with national numbering plans already in existence. (Standardization of a code for access to the international automatic network would have been useful to international travellers.)

7.2 *Country code* [1]

7.2.1 Country codes will be used:

— in semi-automatic working, to route calls to the required country when the calls are transit calls or when, on the outgoing positions, there is common dialling access to all the outgoing routes;

— in automatic working.

7.2.2 A list of country codes was prepared by the C.C.I.T.T. in 1964 within the framework of a world-wide automatic telephone numbering plan.

This list was set up according to the following principles:

a) the number of digits of the country code is one, two or three according to the foreseeable telephonic and demographic development of the country concerned;

b) the nine digits from 1 to 9 have been allocated as the country code or as the first digit of the country code. These digits define *world numbering zones*;

c) in the case of Europe, owing to the large number of countries requiring two-digit codes, the two digits 3 and 4 have been allocated as the first digit of the country codes.

7.2.3 The list of country codes is given at the end of this Recommendation.

7.3 *Trunk prefix* [1]

7.3.1 The national (significant) number (see definition 6 of Recommendations E.160 and Q.10) does not include the trunk prefix. Accordingly, in international service, the trunk prefix of the country of destination must not be dialled.

[1] See definitions in Recommendations E.160 and Q.10.

It should be noted that, in some countries, it is customary to consider *for national purposes* that the trunk prefix is included in the national number (which is then not the national (significant) number). A careful distinction must therefore be made between such national definition or practice and the C.C.I.T.T. definition, which is internationally valid. In order to avoid misunderstanding, the C.C.I.T.T. definition includes the word " significant " between brackets, reading as follows: " national (significant) number ".

7.3.2 The C.C.I.T.T. recommends that Administrations ask those subscribers likely to receive an appreciable amount of international traffic to indicate on their letter-heads, next to their telephone number as dialled in the national service, a second number for the international service in which:

— the trunk prefix does not appear;

— the letters are converted into digits (where applicable);

— the national (significant) number is preceded by the country code.

Example:

For a subscriber in London whose subscriber number is 340 1234

national number:	0	1	340	1234
international number:	44	1	340	1234

7.3.3 It is recommended by the C.C.I.T.T. that the Administrations of countries that have not yet adopted a trunk prefix for access to their national automatic trunk network should adopt a prefix composed of a single digit, preferably 0.

The reasons for this recommendation are:

— to provide the maximum degree of standardization of the trunk prefixes used in different countries, so that dialling is made as easy as possible for a person travelling in different countries, and

— to minimize the number of digits to be dialled in the national automatic service.

7.3.4 In the automatic international service, following the international prefix and country code of the called country, the caller should dial the national (significant) number of the called subscriber (i.e. without dialling the trunk prefix).

LIST OF COUNTRY CODES FOR THE INTERNATIONAL SEMI-AUTOMATIC AND AUTOMATIC SERVICE

Foreword

In accordance with the decision reached by the IIIrd Plenary Assembly of the C.C.I.T.T. (Geneva, 1964), the international telephone numbering plan should mention only the codes of countries within the jurisdiction of the Members and Associate Members of the International Telecommunication Union, and the names of those countries should be as they appear in the International Telecommunication Convention.

In the list hereunder, the countries in each world numbering zone are not arranged in alphabetical order but in the numerical order of their codes, those with two-digit codes preceding those with three-digit codes.

Each " territory " which has been given a country code, but the telecommunications of which come under the international jurisdiction of another State, is listed:

— either immediately after that State when it is in the same numbering zone,

— or at the end of the code list in the relevant numbering zone when the State responsible for its telecommunications is included in a different numbering zone.

Numbering zone 1 is an integrated numbering area covering the North-American continent and the countries in it are listed in geographical order from North to South, beginning with Canada.

" Territories " the telecommunications of which come under the jurisdiction of other States are listed in the different numbering zones in the order and with the official names used in the " List of countries, territories and groups of territories Members or Associate Members of the International Telecommunication Union ", published by the I.T.U. General Secretariat.

Some countries and territories are represented in the Union by members specifically empowered for this purpose. These countries and territories are followed by (1), (2), (3), (4) or (5), meaning:

(1) Territory represented by the French Overseas Post and Telecommunication Agency.

(2) Spanish Province in Africa.

(3) Portuguese Oversea Province.

(4) Territory of the United States.

(5) Overseas Territory for the international relations of which the Government of the United Kingdom of Great Britain and Northern Ireland are responsible.

Revised list of country codes incorporating amendments proposed by the World Plan Committee, Mexico City, 1967

World numbering ZONE 1

Canada
St. Pierre and Miquelon (1)
United States of America, including Puerto Rico and the Virgin Islands
Jamaica
Costa Rica
El Salvador (Republic of)
French Antilles (France)
Honduras (Republic of)
Nicaragua
Panama
Barbados
Antigua (5)
Cayman Islands (5)
British Virgin Islands (5)
Bermuda (5)
Bahamas (5)
British Honduras (5)
Dominica (5)
Grenada (5)
Montserrat (5)
St. Kitts (5)
St. Lucia (5)
St. Vincent (5)

World numbering ZONE 2

United Arab Republic	20	Congo (Rep. of the) (Brazzaville)	242
Algeria (Algerian Dem. and Pop. Rep.)	21	Congo (Dem. Rep. of the)	243
Morocco (Kingdom of)	21	Angola (3)	244
Tunisia	21	Portuguese Guinea (3)	245
Libya (Kingdom of)	21	Sudan (Republic of the)	249
Gambia	220	Rwanda (Republic of)	250
Senegal (Republic of the)	221	Ethiopia	251
Mauritania (Islamic Republic of)	222	Somali Republic	252
Mali (Republic of)	223	French Somaliland (1)	253
Guinea (Republic of)	224	Kenya	254
Ivory Coast (Republic of the)	225	Tanzania (United Rep. of) (mainland)	255
Upper Volta (Republic of)	226	Uganda	256
Niger (Republic of the)	227	Burundi (Kingdom of)	257
Togolese Republic	228	Mozambique (3)	258
Dahomey (Republic of)	229	Zanzibar (Tanzania)	259
Liberia (Republic of)	231	Zambia (Republic of)	260
Sierra Leone	232	Malagasy Republic	261
Ghana	233	Reunion (France)	262
Nigeria (Fed. Rep. of)	234	Rhodesia	263
Chad (Republic of the)	235	Territory of South-West Africa	264
Central African Republic	236	Malawi	265
Cameroon (Fed. Rep. of)	237	Lesotho	266
Cape Verde Islands (3)	238	Botswana	267
St. Thome and Principe (3)	239	Swaziland	268
Equatorial Guinea (2)	240	Comoro Islands (1)	269
Gabon Republic	241	South Africa (Republic of)	27

Spare codes 28, 29, 230, 246, 247, 248

World numbering ZONES 3 and 4

Greece	30	Denmark	45
Netherlands (Kingdom of the)	31	Sweden	46
Belgium	32	Norway	47
France	33	Poland (People's Republic of)	48
Spain	34	Federal Republic of Germany	49
Hungarian People's Republic	36	Gibraltar (5)	350
*	37	Portugal	351
Yugoslavia (Fed. Rep. Soc. of)	38	Luxembourg	352
Italy	39	Ireland	353
Roumania (Soc. Rep. of)	40	Iceland	354
Switzerland (Confederation of)	41	Albania (People's Republic of)	355
Czechoslovak Socialist Republic	42	Malta	356
Austria	43	Cyprus (Republic of)	357
United Kingdom of Great Britain and Northern Ireland	44	Finland	358
		Bulgaria (People's Republic of)	359

* (It is pointed out that the use of the code 37 has been the subject of bilateral agreements published in I.T.U. notification 980 of 10 March 1966.)

World numbering ZONE 5

Mexico	52	Guyana	592
Cuba	53	Ecuador	593
Argentine Republic	54	French Guyana (France)	594
Brazil	55	Paraguay	595
Chile	56	Peru	596
Colombia (Republic of)	57	Surinam (Netherlands)	597
Venezuela (Republic of)	58	Uruguay (Oriental Republic of)	598
Guatemala	500 [1]	Netherlands Antilles (Netherlands)	599
Bolivia	591		

Spare codes: 51; 501 to 509; 590

[1] The numbering plan for Central America is in preparation.

World numbering ZONE 6

Malaysia	60	Tonga (5)	676
Australia (Commonwealth of)	61	Solomon Islands (5)	677
Indonesia (Republic of)	62	New Hebrides (5)	678
Philippines (Republic of the)	63	Fiji Islands (5)	679
New Zealand	64	Wallis and Futuna (1)	681
Singapore	65	Am. Samoa (4)	684
Thailand	66	Gilbert and Ellice Islands (5)	686
Portuguese Timor (3)	672	New Caledonia (1)	687
New Guinea and Papua (Australia)	675	French Polynesia (1)	689

Spare codes: 69, 670, 671, 673, 674, 680, 682, 683, 685, 688

VOLUME II-A — Rec. E.161, p. 9; VOLUME VI — Rec. Q.11, p. 9

World numbering ZONE 7

Union of Soviet Socialist Republics	7

World numbering ZONE 8

Japan	81	Macao (3)	853
Korea (Republic of)	82	Cambodia (Kingdom of)	855
Viet-Nam (Republic of)	84	Laos (Kingdom of)	856
Hong Kong (5)	852	China	86

Spare codes { 80, 83, 87, 88, 89
850, 851, 854, 857, 858, 859

World numbering ZONE 9

Turkey	90	Saudi Arabia (Kingdom of)	966
India (Republic of)	91	Yemen	967
Pakistan	92	*	968*
Afghanistan	93	Southern Yemen (People's Republic of)	969
Ceylon	94	*	971*
Burma (Union of)	95	Israel (State of)	972
Lebanon	961	**	973**
Jordan (Hashemite Kingdom of)	962	*	974*
Syrian Arab Rep.	963	Mongolian People's Republic	976
Iraq (Republic of)	964	Nepal	977
Kuwait (State of)	965	Iran	98

Spare codes { 99
960, 970, 975, 978, 979

* See I.T.U. notifications 992, 995 and 998 (1967).

** (It is pointed out that the use of the code 973 has been the subject of bilateral agreements published in I.T.U. notification 984 of 10 July 1966.) (See also notification 992.)

ANNEX

Ref. *Notification 980*

In its relations with the German Democratic Republic, the Administrations of the People's Republic of Bulgaria, of the Hungarian People's Republic, of the People's Republic of Poland, of the Socialist Republic of Roumania, of the Czechoslovak Socialist Republic and of the Union of Soviet Socialist Republics will use the following code for telephone traffic:

	Telephone
German Democratic Republic	37

Ref. *Notifications 984, 992, 995, 998*

In its relations with Bahrain, Qatar, the Sultanate of Muscat and Oman, and the Trucial States, the Administration of the United Kingdom of Great Britain and Northern Ireland will use the following codes for telephone traffic:

	Telephone
Bahrain	973
Qatar	974
Sultanate of Muscat and Oman	968
Trucial States	971

Volume II-A **Volume VI**

PART I PART II

CHAPTER V CHAPTER III

ROUTING PLAN FOR INTERNATIONAL SERVICE

RECOMMENDATION E.170 RECOMMENDATION Q.12

OVERFLOW — ALTERNATIVE ROUTING — REROUTING — AUTOMATIC REPEAT ATTEMPT

1. When a call cannot find a free circuit in one group of circuits (first choice), technical arrangements can be made to route the call automatically via another group of circuits (second choice), at the same exchange; this process is called *overflow*. There may be also overflow, at the same exchange, from a second choice group of circuits to a third choice group of circuits, etc.

2. When the group of circuits over which the overflow traffic is routed involves at least one exchange not involved in the previous choice route, the process is called *alternative routing*.

3. It should be noted that overflow can occur without alternative routing for cases such as, when there are in one relation two groups of circuits, one group reserved for one-way operation and the other group used for both-way operation. In this case, when all one-way circuits are busy, the call can overflow to the both-way circuit group.

4. When congestion occurs at a transit exchange, arrangements can be made in some signalling systems, at the outgoing international exchange on receipt of a busy-flash signal or a congestion signal sent by the transit exchange, to reroute the call automatically from the outgoing international exchange over another route. This process is called *rerouting* *.

It should be noted that rerouting serves no purpose when congestion conditions exist at the incoming exchange. In the same way, a call must not overflow from a direct route used exclusively for terminal traffic to an alternative transit route if the busy-flash signal or a congestion signal has been received on the direct route.

* The use of rerouting is not envisaged in the International Routing Plan.

5. When a difficulty is encountered in the setting-up of a connection—such as double seizure on both-way circuits or error detection—arrangements can be provided to make another attempt to set up the connection for that call from the point where the first attempt took place. This process is called *automatic repeat attempt.*

An automatic repeat attempt may take place

— on the same circuit, or

— on another circuit of the same group of circuits, or

— on a circuit in another group of circuits.

RECOMMENDATION E.171 RECOMMENDATION Q.13

THE INTERNATIONAL ROUTING PLAN

1. Introduction

1.1 The following sections contain definitions and recommendations for the International Routing Plan.

Section 2: Structure of the International Routing Plan;

Section 3: Basic rules for routing;

Section 4: Effects of satellite communications;

Section 5: Additional rules for routing.

1.2 The International Routing Plan described in this Recommendation has been revised within the limits of the knowledge available at the time of revision in 1967 and particularly with a view to application during the ensuing five years. It is recognized that future revision will be necessary when further information becomes available concerning demand assignment satellite systems and future methods of routing control including network management.

1.3 The Plan concerns automatic and semi-automatic telephone traffic. An objective in developing the automatic and semi-automatic service is to enable a satisfactory connection between any two stations in the world. The Plan is necessary to allow the objective to be achieved with maximum economy by the most efficient use of costly circuits and switching centres while safeguarding the grade of service and the quality of transmission.

1.4 The Plan should be able to evolve as a function of traffic streams, the establishment of new routes and new international centres. The application of the Plan should be considered well in advance of any change to semi-automatic or automatic operation. However, caution should be exercised against premature decisions on transit points, etc., before the full routing possibilities have been evaluated.

1.5 The International Routing Plan has been established independently of the numbering plan, the rules for charging the calling subscriber, and the rules for the apportionment of charges (international accounting).

2. Structure of the International Routing Plan

2.1 *Switching of international calls*

International calls originated in a national telephone network will be switched to the world-wide telephone network through a transit centre (called hereafter CT) which can interconnect national circuits and international circuits. This CT acts as international originating centre.

A similar transit centre (called hereafter CT) serves the incoming international calls to be switched to the national network. That CT centre acts as international destination centre.

Between an international originating centre and an international destination centre, a number of international transit centres which can interconnect international circuits, may, if necessary, be used to switch the calls through the world-wide telephone network.

2.2 *Transit centres*

There are three categories of transit centres, called CT1, CT2 and CT3.

According to the theoretical final route structure of the network described below, each CT1 and each CT2 interconnects international circuits, thus acting as an international transit centre.

A CT3 normally acts as a transit centre interconnecting only a national network (or part of it) and international circuits. However, there are cases where a CT3, permanently or temporarily, may act as a transit centre of another category for specified routes.

2.3 *Theoretical final route structure (backbone structure) of the network*

The international telephone network has a theoretical final route structure (backbone structure) as illustrated in Figure 1.

2.3.1 A first category transit centre, CT1, may serve a continent or part of it. Each CT1 is connected by low loss probability circuits groups to all CT2s in its zone and to all other CT1s.

2.3.2 A second category transit centre, CT2, serves a part of the zone of the parent CT1. In a very large country the zone of a CT2 may be restricted to its own country or even to a part of it.

Each CT2 is connected by low loss probability circuit groups to all CT3s in its zone and to its homing CT1.

2.3.3 A third category transit centre, CT3, serves a part of the zone of the parent CT2. As a general rule, the zone of a CT3 is restricted to its own country or even to a part of it.

Each CT3 is connected by a low loss probability circuit group to it homing CT2.

2.3.4 The route followed by an international call from any CT of an originating chain (CT3 - CT2 - CT1) to any CT of a terminating chain (CT1 - CT2 - CT3) only via the low loss probability circuit groups of the backbone structure is called the *theoretical final route*. The theoretical final route has no overflow possibilities.

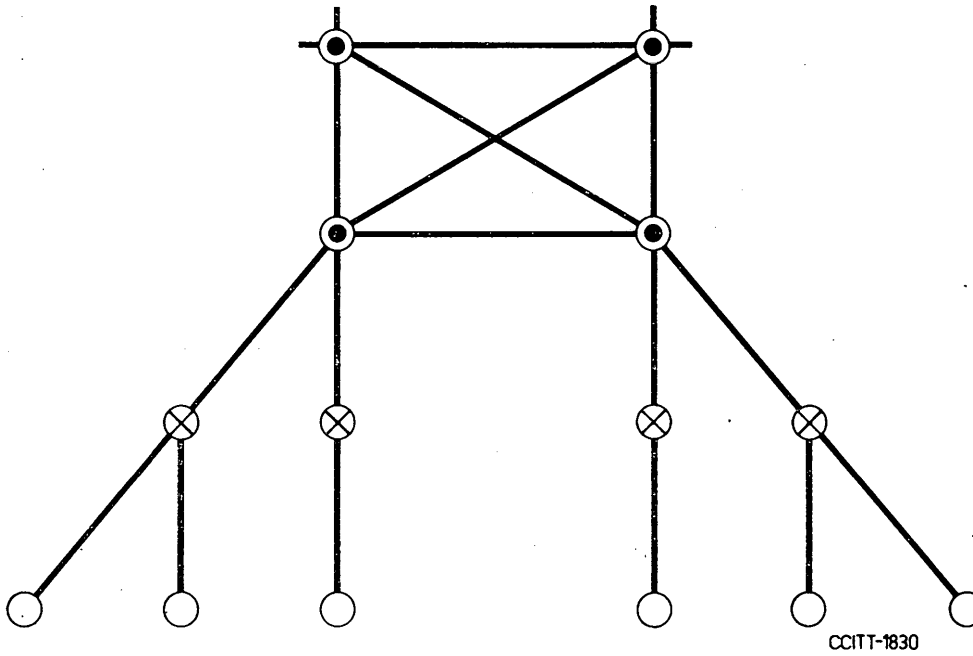


FIGURE 1. — **Theoretical final route structure (backbone structure) of the international telephone network**

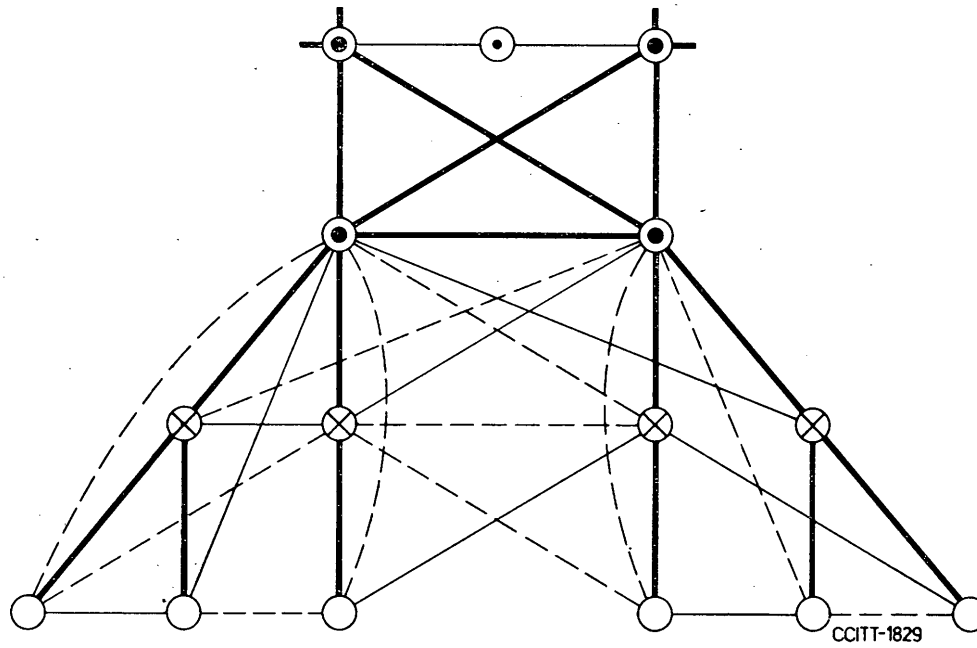


FIGURE 2. — **Example of actual structure of the international telephone network**

CT1 = First category transit centre

CT2 = Second category transit centre

CT3 = Third category transit centre

CTX = (CT of unspecified category)

Theoretical final route

Actual final route
(low loss probability circuit group)

High-usage route
(High-usage circuit group)

2.4 *Actual structure of the network*

The actual network structure will be vastly expanded by the use of direct circuit groups and will not be restricted to its backbone structure. Many CTs will be directly interconnected to fulfil the aims of the International Routing Plan as well as possible.

2.4.1 *International direct circuit groups* may be established between any two CTs of any category in order to effect routing economy and other service benefits. Such direct circuit groups will by-pass the theoretical final route or part of it. These circuit groups may be dimensioned with a low loss probability (without overflow facilities) or they may be set up as high-usage groups (with overflow facilities).

2.4.2 The route followed by an international call from any CT of an originating chain to any CT of a terminating chain only via circuit groups without overflow facilities is called the *actual final route*. An actual final route may coincide with the theoretical final route or parts of it.

2.4.3 In cases where a significant economy may be made and provided that transmission and other quality of service standards are maintained, two CT1s may be interconnected through an intermediate transit centre of unspecified order (hereinafter called CTX). The CTX then acts as a CT1 for this traffic and must be connected to the other two CT1s by low loss probability circuit groups, provided for actual final route grade of service.

2.4.4 The traffic between two countries can be routed either by international direct circuits (as already mentioned in paragraph 2.4.1) or through international transit centres.

To obtain a good loading of the long and costly circuits a substantial fraction of the international traffic may be allowed to overflow from a direct circuit group, called high-usage group, directly or lastly to an actual final route which must be dimensioned to handle this traffic.

An example of the actual structure of the world-wide telephone network, including its backbone structure, is given in Figure 2.

3. Basic rules for routing

3.1 *Number of circuits in tandem*

For reasons of transmission quality and the efficient operation of signalling, it is desirable to limit as much as possible the number of circuits connected in tandem.

The apportionment between national and international circuits in such a chain may vary.

The maximum number of circuits to be used for an international call is 12 with up to a maximum of 6 of the circuits being international.

In exceptional cases and for a low number of calls, the total number of circuits may be 14, but even in this case the maximum number of international circuits is 6.

3.2 *Routing principles*

This paragraph specifies the rules to be followed for routing traffic between two countries which are connected by a high-usage group which cannot act as a part of an actual final route.

3.2.1 The division of the world-wide telephone network into zones of various classes applies directly to the theoretical final route and it is a guide for all traffic routing.

3.2.2 The routing of all outgoing traffic from a CT, whether originating or in transit, is determined by the Administration having that CT. It is assumed that the transit Administration having that CT will have reached prior agreement with the terminal Administrations whose traffic is to be handled in transit, in regard to the general conditions for routing this traffic.

The routing of outgoing traffic may be altered according to the time of day or period of the year; when the routing conditions on leaving a transit CT are changed by the Administration to which the CT belongs it is essential for the Administrations using the CT as a transit point for their traffic to be informed of the changes.

3.2.3 From a CT, the various circuit groups for routing a call are used in the following order:

a) high-usage direct route, if it exists,

b) high-usage transverse routes which by-pass a part of the actual final route. The order of selection of the routes begins with those that end up at the transit centres nearest to the international destination centre) "far-to-near sequence").

c) as a last choice, an actual final route which can be the theoretical final route. The arrangement of the theoretical final route (CT3 - CT2 - CT1) — (CT1 - CT2 - CT3) illustrates the need of 5 international circuits connected in tandem. In cases mentioned in paragraph 2.4.3 there may be the need for connecting in tandem the maximum number of 6 international circuits quoted in paragraph 3.1.

3.2.4 The following rules apply to the use of high-usage circuit groups:

a) As a general rule, a high-usage group is used for traffic to the zone of the CT where this route ends (this includes zones served by CTs of subordinate category in the parent chain);

b) Nevertheless, the same route can be used as a transverse route for traffic to another zone on condition that the route between the second and the third CT is of low loss probability;

c) In the case of a direct route between a CT3 and its CT1, this route can be used as a transverse route to reach any centre connected to this CT1, even if the group of circuits connecting the CT1 to the latter centre is not established with a low loss probability.

4. Effects of satellite communications

4.1 *Use of high altitude satellite circuits*

The introduction of high-altitude satellite circuits on a fixed or time-preassigned basis into the International Routing Plan does not call for any alteration in the basic principles of that Plan [1]. However, the transmission delay associated with such circuits, taken in conjunction with the acceptable limits provisionally specified in Recommendation Q.41 [2] indicates a need for certain precautions:

a) to guard against the inclusion of two or more satellite links in a connection where this can be avoided, and

b) to ensure that the total transmission delay is minimized within the provisions of Recommendation Q.41.

These precautions are enumerated in paragraphs 4.2 and 4.3 respectively.

4.2 *Avoidance of the inclusion of two or more satellite links in an international connection*

Arrangements should be made to prevent the inclusion of two or more satellite links in an international connection. In very exceptional circumstances such a connection may be used, for example where no other reliable means of communication is available or where the connection is required for special purposes.

4.2.1 Where two or more satellite circuit groups are terminated at the same transit centre of whatever category, arrangements should be made to ensure that a connection of two satellite circuits in tandem should not be used except under the most exceptional circumstances.

4.2.2 The exclusive use of satellite circuits in a group used for transit traffic that may be expected to utilize another satellite link elsewhere in the connection should be avoided whenever possible. This applies particularly to a circuit group forming part of an actual final route.

4.3 *Minimizing transmission delay*

4.3.1 In so far as possible, final routes should use terrestrial circuits.

4.3.2 When a circuit group has both terrestrial and satellite circuits, the choice of circuit for use as part of a connection should be governed by:

a) the guidance given in the provisions of Recommendation Q.41, and

b) the possible need to use a satellite circuit in another part of the connection.

---

[1] It is recognized that the various forms of demand assignment of satellite circuits may offer a desirable means for providing direct circuits. This subject is under study by the C.C.I.T.T. in the 1968-1972 period under Question 1/XIII and the results of that study may well lead to some revisions of the International Routing Plan.

[2] If circuits are provided using a satellite channel in one direction of transmission and a terrestrial channel in the other, the mean one-way transmission delay will be less.

4.3.3 Where two or more routings are possible, each involving a satellite circuit and one or more terrestrial circuits, that one is to be preferred that has the shortest total transmission delay.

5. Additional rules for routing

5.1 *Introductory notes*

The next paragraph of this section describes supplementary routings which are admissible in the International Routing Plan and which may be introduced as particular arrangements agreed upon by the Administrations concerned. They do not require the provision of any special facilities.

It is emphasized that such routings will apply only in those special cases where significant economic and/or service advantages are to be achieved and will be continued no longer than these benefits remain.

The Administrations concerned should carefully note that special considerations have to be borne in mind, including:

a) procedures for obtaining and employing traffic data and costs associated with supplementary routings may introduce traffic engineering and administration complexities. Great care must be exercised to prevent multiple supplementary routings from disrupting the engineering and circuit provision of the world-wide telephone network;

b) many routing procedures which are admissible in a single traffic flow direction are not reciprocal and may therefore introduce different transit payments in the two traffic flow directions;

c) in some cases the transit facilities may need to be introduced or augmented. This applies in particular when a CT3 has to provide international transit facilities in certain specific relations;

d) the provision of high-usage circuits by-passing portions of the final route is desirable for very long connections in order to reduce the number of switched circuits in tandem. As a consequence the quality of service will be improved;

e) the use of supplementary routes without overflow facilities may result in a reduced grade of service because of the reduced ability to absorb overload.

5.2 *Supplementary routing principles*

5.2.1 The design of supplementary routings should ensure that the route selected or its alternatives will never involve a greater number of circuits in tandem than would be involved by the theoretical final route for the call. Exceptions are allowed for supplementary routings between CT1s (see paragraph 5.2.7).

5.2.2 Supplementary routings should not be combined in tandem to form further supplementary routes.

5.2.3 Special consideration must be exercised to ensure that two satellite circuits will not be inadvertently employed in the same connection (see paragraph 4.2 for complete details).

5.2.4 Calls may leave the originating chain (CT3 - CT2 - CT1) at any centre but only one link in the chain may be traversed in the direction of decreasing category. In this case the outgoing route beyond the mentioned one link must be a low loss probability route without overflow facilities. Figures 3 a and 3 b show such routing from CT A to CT B.

5.2.5 Calls may enter a terminating chain (CT1 - CT2 - CT3) at any centre but may traverse only one link in the direction of increasing category. Such routings are shown in Figures 3 c and 3 d from CT A to CT B.

5.2.6 Calls may be routed over direct or transverse circuits via a transit centre of unspecified category in an intermediate chain, but if this CT is not of higher category than the exit centre of the originating chain, then the terminating chain must be entered by a low loss probability route without overflow facilities. Calls cannot be routed in this way if they have traversed in the direction of decreasing category a link in the originating chain. Figure 3 e gives an example of this type of supplementary routing.

5.2.7 In some cases large time differences in circuit group busy hours may be exploited by permitting additional switching of circuits in tandem at no more than two intermediate CTXs to interconnect two CT1s. Care must be exercised to provide for a sufficient number of circuits to accommodate the total traffic for each interval of the entire day. Figure 3 f illustrates this rule, which applies to both traffic flow directions.

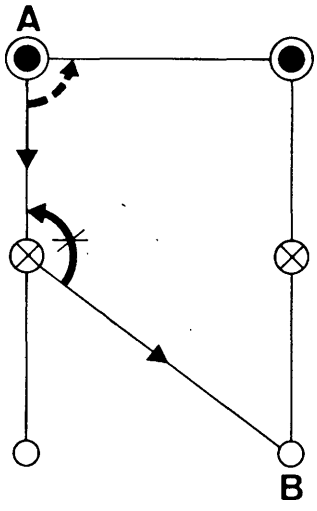


Figure a. — See 5.2.4

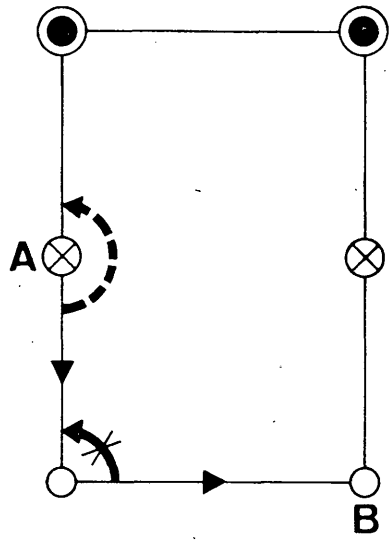


Figure b. — See 5.2.4

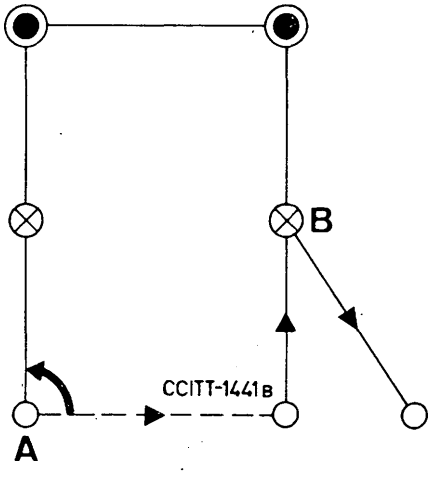


Figure c. — See 5.2.5

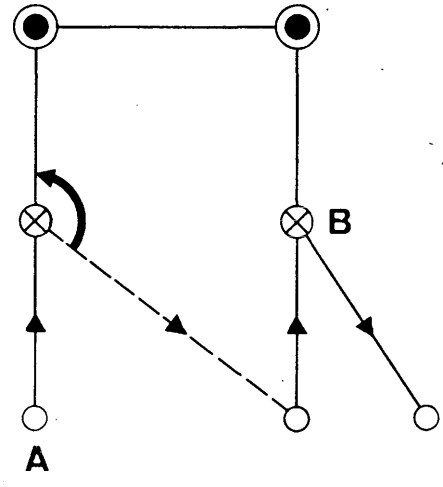


Figure d. — 5.2.5

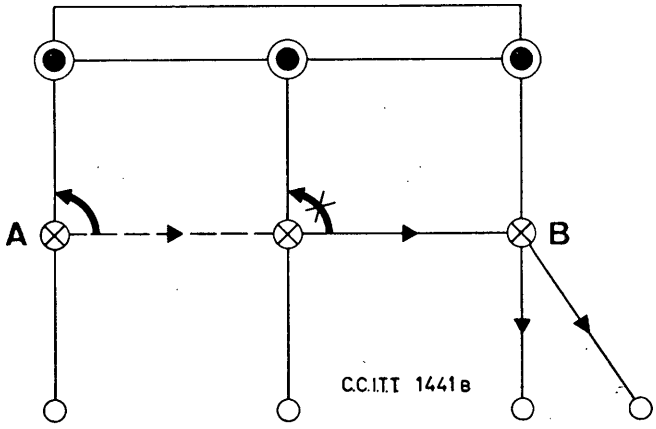


Figure e. — See 5.2.6

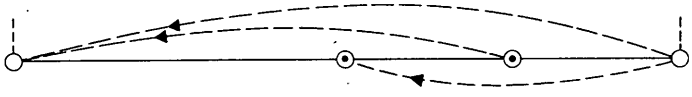


Figure f. — See 5.2.7

FIGURE 3. — **Examples of supplementary routings**

CT1 = First category transit centre

CT2 = Second category transit centre

CT3 = Third category transit centre

CTX = (CT of unspecified category)

Theoretical final route

Actual final route
(low loss probability circuit group)

High-usage route
(High-usage circuit group)

Overflow

Possible overflow

Overflow not allowed

Volume II-A **Volume VI**

PART I PART II

CHAPTER VI CHAPTER V

TONES FOR NATIONAL SIGNALLING SYSTEMS

RECOMMENDATION E.180 RECOMMENDATION Q.35

CHARACTERISTICS OF THE RINGING TONE, THE BUSY TONE, THE CONGESTION TONE, THE SPECIAL INFORMATION TONE AND THE WARNING TONE [1]

1. *General*

Administrations are reminded of the advantages of standardizing as far as possible supervisory tones, so that subscribers and operators may quickly recognize any tone transmitted, of whatever origin.

In considering the degree of possible standardization, the C.C.I.T.T. in 1960 took account of the nature of the various tones already used in Europe, and set limits for cadence, frequency and level so that in the C.C.I.T.T. view no confusion will be caused when subscribers hear these tones. It was also considered that Administrations introducing new tones would find it helpful to know the preferred limits of cadence, frequency and level.

Limits for tone cadences and frequencies are set forth below, all working tolerances being included in the limits.

Besides the limits applying to specifications of new equipment for new exchanges, limits have been laid down for application to existing exchanges.

These latter limits are herein called "*accepted*" limits, while those for new equipment are called "*recommended*" limits.

2. *Power levels for tones*

2.1 For international purposes, the levels of the ringing tone, the busy tone, the congestion tone and the special information tone have to be defined at a zero relative level point at the incoming (in the traffic direction) end of the international circuit.

[1] See also Supplement No. 4 to Volume VI of the *White Book* for particular values of tone cadences and frequencies in actual use.

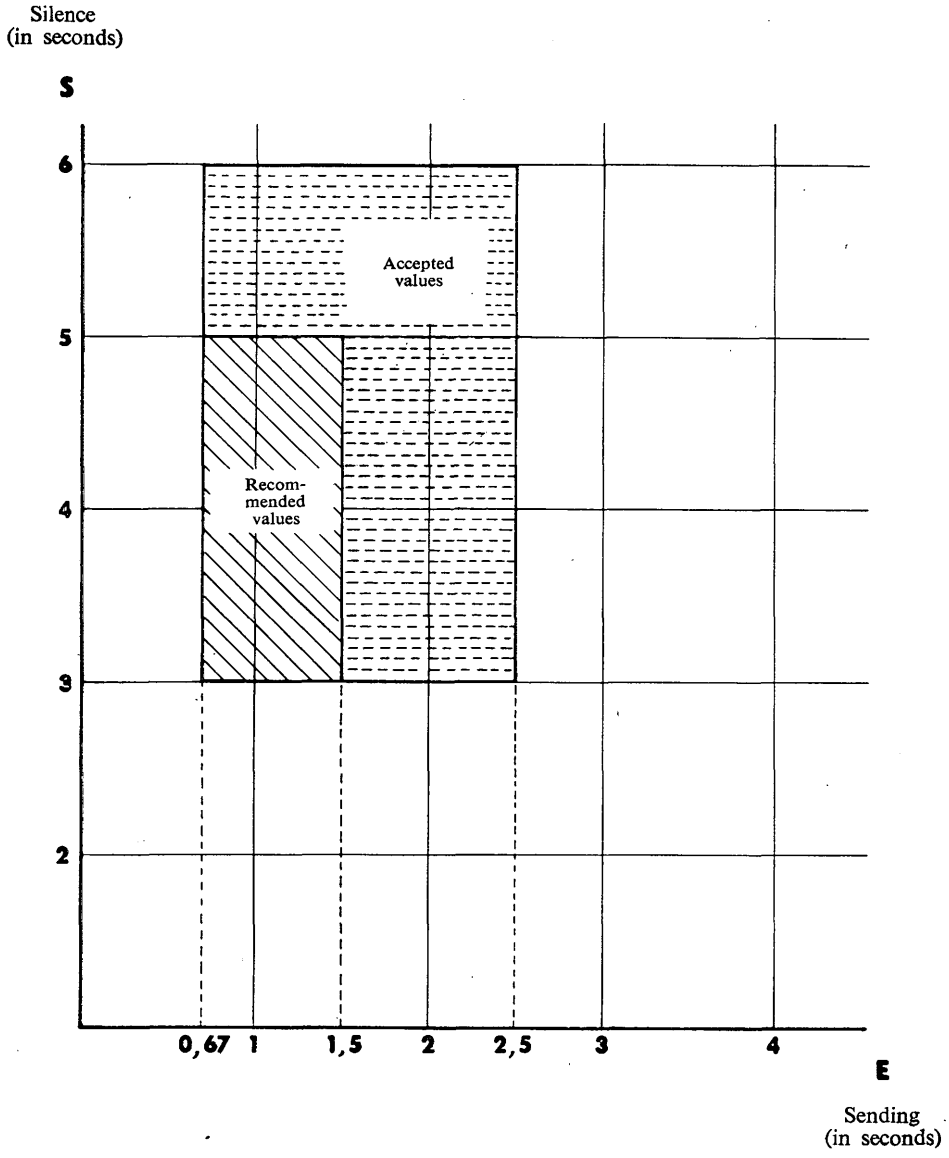


FIGURE 1. — **Ringing tone**

Frequency:

— recommended interval: 400-450 Hz

— accepted interval: 340-500 Hz

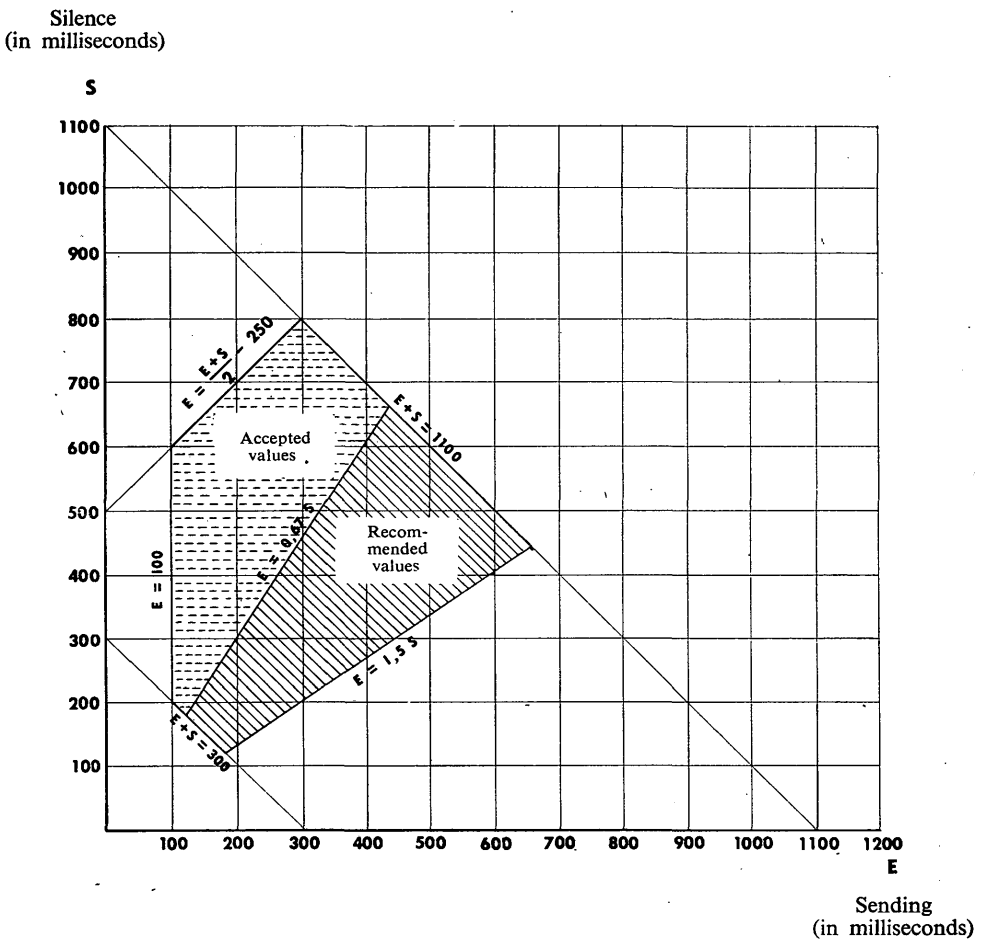


FIGURE 2. — **(Subscriber) busy tone and (equipment or circuit group) congestion tone**

Frequency:

— recommended interval: 400-450 Hz

— accepted interval: 340-500 Hz

The level of tones so defined must have a nominal value of –10 dBm0. The recommended limits should be not more than –5 dBm0 nor less than –15 dBm0 measured with continuous tone.

For the special information tone, a difference in level of 3 dB is tolerable between any two of the three frequencies which make up the tone.

2.2 The level of the " warning tone " described under 6 has to be defined at a zero relative level point at the incoming or at the outgoing end of the international circuit.

This level should not be higher than –5 dBm0 measured with continuous tone.

3. *Ringing tone*

3.1 Ringing tone is a *slow* period tone, in which the tone period is shorter than the silent period.

The *recommended* limits for the tone period (including tolerances) are from 0.67 to 1.5 second. For existing exchanges, the *accepted* upper limit for the tone period is 2.5 seconds.

The *recommended* limits for the silent period separating two tone periods are 3 to 5 seconds. For existing exchanges, the *accepted* upper limit is 6 seconds.

The first tone period should start as soon as possible after the called subscriber's line has been found.

Figure 1 shows the recommended and accepted limits for the ringing tone periods

3.2 The *recommended* frequency for the ringing tone should be between 400 and 450 [1] Hz. The *accepted* frequency should not be less than 340 Hz, nor more than 500 Hz. Frequencies between 450 and 500 Hz in the accepted frequency range should, however, be avoided.

The ringing tone frequency may be modulated by a frequency between 16 and 100 Hz, but such modulation is not recommended for new equipment. If the accepted frequency is more than 475 Hz, no modulation by a lower frequency is allowed.

4. *Busy tone and congestion tone*

4.1. The (subscriber) busy tones and the (equipment or circuit group) congestion tone are *quick* period tones in which the tone period is theoretically equal to the silent period. The total duration of a complete cycle (tone period E + silent period S) should be between 300 and 1100 milliseconds.

The ratio $\frac{E}{S}$ of the tone period to the silent period should be between 0.67 and 1.5 (*recommended* values).

[1] For the frequencies used in the North American network, see Supplements Nos. 4 and 5 to Volume VI of the *White Book*.

For existing exchanges, or for tones to be used in a special way, it is *accepted* that the tone period may be 250 milliseconds shorter than the theoretical value $\frac{E+S}{2}$ (which gives $E = \frac{E+S}{2} - 250$, that is to say, $E = S - 500$ milliseconds). In no circumstances should the tone period be shorter than 100 milliseconds.

Figure 2 shows the recommended and the accepted areas for the busy tone and the congestion tone periods.

4.2 The (subscriber) busy tone condition and the (equipment or circuit group) congestion condition may be indicated by one and the same audible tone, as is often the case in existing national networks.

For newer developments an Administration may wish to adopt a distinction in the tones denoting these conditions; for international uniformity it is recommended that in these circumstances:

a) the same *frequency* should be used for the busy tone and for the congestion tone,

b) the busy tone should have a slower *cadence* than the congestion tone but both cadences should be within the limits mentioned under 4.1.

4.3 The *recommended* frequency for the busy tone and for the congestion tone must be between 400 and 450 Hz [1]. The *accepted* frequency must not be less than 340 nor more than 500 Hz. Frequencies between 450 and 500 Hz in the accepted frequency range should, however, be avoided.

5. *Special information tone*

5.1 The special information tone is a *standardized international tone* universally comprehensible and designed to invite the calling subscriber, in international automatic working, to get in touch with an operator in his country when he cannot understand a message orally received.

The special information tone is provided for special cases, that is to say, all cases in which neither the busy nor the ringing tone can give the required information to the calling subscriber. There are three instances in which it may be used:

a) when the call is connected to a recorded voice machine; the tone is then given during the silent intervals between transmissions of the announcement;

b) under arrangements made at manual positions serving lines which have been abnormally routed so that by operating a key the operators may send the special information signal when, for example, the calling subscriber fails to understand the operator;

[1] For the frequencies used in the North American network, see Supplements Nos. 4 and 5 to Volume VI of the *White Book*.

c) when in special cases no provision is made for recourse either to a recorded announcement or to an operator, the special tone must be connected by the equipment at the point which the calls have reached.

5.2 The special information tone has a tone period theoretically equal in length to the silent period.

Tone period. — The tone period consists of three successive tone signals, each lasting for 330 ± 70 milliseconds. Between these tone signals there may be a gap of up to 30 milliseconds.

Silent period. — This lasts for 1000 ± 250 milliseconds.

5.3 The frequencies used for the three tone signals are:

950 ± 50 Hz; 1400 ± 50 Hz; 1800 ± 50 Hz,

sent in that order.

6. *Warning tone to indicate that a conversation is being recorded*

Where a conversation is being recorded at a subscriber's station the Administration *, if it so desires, may cause the subscriber to introduce a warning tone to indicate that the conversation is being recorded. When such a tone is applied, it is recommended that:

a) it consists of a 350-500 ms pulse every 15 ± 3 seconds of recording time, and

b) the frequency of the tone is 1400 Hz $\pm 1.5\%$.

7. *Machine recognition of tones*

The C.C.I.T.T. appreciates the value of machine recognition of tones for the purpose of service observations, maintenance, testing or for the collection of statistics where equivalent electrical signals do not exist. However, the C.C.I.T.T. considered, at Mar del Plata in 1968, that such machine recognition should not be a substitute for electrical signals.

Where machine recognition of audible tones is to be introduced, the tone frequencies and cadences must be within close limits of precision.

It is not envisaged that machine recognition of tones will be applied outside a national or an integrated network.

* or recognized private operating Agency.

PART II

CHARGING AND ACCOUNTING IN THE INTERNATIONAL TELEPHONE SERVICE

CHAPTER I

INTERNATIONAL TELEPHONE CHARGES

RECOMMENDATION E.200

CHARGING IN AUTOMATIC INTERNATIONAL TELEPHONE SERVICE

I. PRINCIPLES FOR CHARGING

1. *It has been considered* that, in accordance with the provisions of Article 26 of the Telephone Regulations (Geneva, 1958), international calls should be charged for on the basis of a minimum indivisible period of 3 minutes, and then by whole minutes:

1.1 these provisions were made at a time when automatic international service was not envisaged;

1.2 many Administrations [1] have adopted methods of charging for use with their national automatic service, in which the charges are recorded on subscribers' meters, but based on two different principles:

a) some Administrations [1] have for many years used a system based on trains of meter-pulses issued at the start of each period of 3 minutes, the number of pulses in the train depending on distance;

b) other Administrations [1] use, or intend to use, a system based on individual meter-pulses issued at short intervals of time, the length of the interval depending on the distance;

1.3 Certain Administrations [1] which have adopted the system of charging by periodic pulses in their national services have made it known that it will not be possible for them to use a different system of charging for automatic international calls;

[1] or recognized private operating Agencies.

1.4 the use, on the same international relation:

a) at one end, of a 3 minute + 3 minute method of charging (national type) or of a 3 minute + 1 minute method of charging (the type prescribed in the *International Telephone Regulations*);

b) at the other end, of a periodic pulse method of charging (national type);

would lead to a grave dissymmetry in the charges made to users in the two countries concerned.

1.5 This serious dissymmetry would be likely to provoke adverse reactions from the subscribers of one country, who would be less favourably treated than their correspondents in the other country;

1.6 This serious dissymmetry would be likely to create certain financial difficulties for one of the countries:

a) as a result of changes which may possibly take place in the balance of traffic;

b) as a result of the fact that the country which charged on the basis set out in 1.4 a) above would receive, in respect of the use of its system for " incoming " traffic, substantially less than it would collect from its own subscribers.

2. In order to avoid too great a dissymmetry in the charges collected, it is recommended that either of the two following methods of charging may be used in the international automatic service:

a) charging minute by minute;

b) charging by periodic pulses, of the type used in the national automatic services.

II. Reduction of dissymmetry in the charges

1. As the existence, in the same relation, of the two methods a) and b) above lead to a dissymmetry in the charges made, and as moreover the existence, in the same relation, of periodic charging methods with different intervals in the two countries concerned results in a very small dissymmetry in the charges made, in a given service between two countries A and B, the Administrations * shall endeavour to see that the revenue obtained from users and the amounts entering in the international accounts correspond.

2. Hence, for a given relation, each Administration * fixes the unit-charge and the unit-interval according to the characteristics of its national charging system but endeavours to observe the following equalities:

$$\sum_{n} d_r\, u_r = \sum_{n} d_A\, u_A = \sum_{n} d_B\, u_B$$

which equalities apply to a group of n messages chosen in such a way as to constitute a representative sample of the traffic on the relation in question.

* or recognized private operating Agency (or Agencies).

In this equality,

d_r = actual call duration,

d_A = chargeable duration in the charging system of country A,

d_B = chargeable duration in the charging system of country B,

u_r = unit-charge used in drawing up international accounts in the automatic international service,

u_A = charge per unit-interval in the charging system of country A,

u_B = charge per unit-interval in the charging system of country B.

Notes. — d_r is expressed in minutes, with the appropriate decimals.

d_A and d_B are expressed by the whole number of unit-intervals in the charging system of country A or country B (the interval between two periodic pulses in periodic-pulse systems, or one minute in a 1+1 system).

u_r is a charge per (actual) call duration, is expressed in gold francs per minute of conversation and is the same for both directions in the relation in question.

RECOMMENDATION E.201

CHARGING FOR CALLS TO SUBSCRIBER'S STATION TEMPORARILY CONNECTED TO THE ABSENT SUBSCRIBERS' SERVICE

1. When a subscriber's line is connected to the absent subscribers' service the absent subscribers' service is assumed to be equivalent to a person answering for the subscriber at the latter's express wish.

The call shall therefore be set up and charged in the normal manner.

1.1 *Station calls*

For station calls charging takes effect when the absent subscribers' service answers

1.2 *Personal calls*

The caller is informed that the line is connected to the absent subscribers' service. If he accepts the call he is charged on the basis of duration and the special charge for a personal call is levied. If he does not accept the call, no charge is levied.

2. This Recommendation is applicable to manual, semi-automatic and automatic services.

RECOMMENDATION E.202

CHARGING FOR CALLS TO A DEVICE SUBSTITUTING A SUBSCRIBER IN HIS ABSENCE

1. Precautions will have to be taken by the Administrations * to warn callers of the presence of the device on the called subscriber's line:

* or recognized private oderating Agencies.

a) devices of this type should be indicated in the telephone directories by means of a special sign ⌀;

b) Administrations * should invite the owners or renters of such equipment to mention the fact on their letter-heads by means of a printed indication.

2. To facilitate the disposal of international traffic on a device of this type, the Administrations * should, when consenting to this equipment, insist that it complies with the essential conditions set out in the following Annex.

ANNEX

(to Recommendation E.202)

Basic specifications for recording apparatus substituting the called subscriber

A. Operating conditions

1. *Delay in answering*

The ringing current from the telephone exchange should be permitted to operate the telephone bell for at least 3 seconds but for not more than 10 seconds before the call is answered by the apparatus. This will enable the call to be answered in the *normal way* in those countries which wish to provide for such a facility. The timing of this interval (3-10 seconds) should be independent of the periodicity or the duration of the ringing current.

2. *Normal conditions for metering and supervision*

In answering a call the apparatus should loop the subscriber's line and should also give the normal conditions for control of metering and for supervision as with a normal subscriber's installation. The disconnection of the apparatus shall break the loop on the subscriber's line.

3. *Announcement of the presence of the apparatus*

a) The presence of the apparatus should be indicated to the calling party by means of a verbal announcement following, in principle, immediately on the closing of the loop on the subscriber's line.

b) This verbal announcement should include, in particular, the following:

- — first, whether the apparatus permits the recording of a message,
- — the subscriber's name or business style,
- — the subscriber's number and particulars of the locality (e.g., Geneva, St. Moritz, etc.),
- — clear instructions as to the functionning of the apparatus (whether a message may be recorded, and if so, the moment when the message may be recorded and the maximum duration of a recording).

B. Signalling conditions

1. *Avoidance of interference from signalling frequencies*

The correct functioning of the apparatus should not depend upon (nor be affected to any extent by) the sending or receiving of signalling frequencies used in the telephone system or specially generated in the apparatus.

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* or recognized private operating Agencies.

2. *Avoidance of interference with national signalling systems by the tones transmitted by the apparatus*

To avoid interference with the national signalling system of a country by the tones transmitted by the apparatus over the network of that country, it is recommended that, in the case of the transmission of tones by the equipment:

— the transmission of tones should be in short pulses and not a continuous transmission;

— the tones should not be composed of a single frequency, but should be a mixture of at least two frequencies, so that the guard circuit of the signal receiver of the corresponding country, where there would be a risk of interference, may operate (for this purpose, the choice of the following frequency-combinations should be avoided:

2040 and 2400 Hz	1200 and 1600 Hz	500 and 20 Hz
600 and 750 Hz		1000 and 20 Hz

C. TRANSMISSION CONDITIONS

Any recording apparatus which takes the place of the called subscriber should give a level and quality of speech comparable to that given when the station is used by a person.

RECOMMENDATION E.203

CHARGING IN AUTOMATIC SERVICE FOR CALLS TERMINATING ON SPECIAL SERVICES FOR SUSPENDED, CANCELLED OR TRANSFERRED SUBSCRIBERS

It is desirable for calls terminating on special services for suspended, cancelled or transferred subscribers in the international automatic service to receive the same treatment in different countries.

The C.C.I.T.T. considers that no charge should be made for these calls and that no answer signal should normally be given when the interception operator of these services intervenes.

RECOMMENDATION E.204

CHARGEABLE DURATION OF CALLS

1. International operators should allow no tolerance in their assessment of the chargeable duration of calls.

2. Metering devices controlled by operators should be rapid in action and have the utmost accuracy.

3. In automatic international service, the chargeable duration should begin from the reception of the answer signal from the called station, since the existence of an unchargeable call period, however short, might lead to misuse of the service for the transmission

of short messages without payment. The chargeable duration ends when the caller gives the clear-forward signal, or if the called subscriber clears before the calling subscriber, when an exchange clears the call. In this latter case, the chargeable duration ends after a delay period following the clear-back signal.

4. It is unnecessary to inform the person making an international call of the exact moment at which the charging begins.

5. An Administration * should not give its operators instructions to advise subscribers of successive charging periods unless a prior agreement to this effect has been reached with the other Administrations *.

6. Nevertheless, if some Administrations * consider it desirable to indicate to callers the expiry of each charging period, an automatic device, or one controlled by the operator at the originating international exchange, can be used for this purpose, on condition that this indication is regarded merely as an advice which is not binding on the Administration * as regards charging.

RECOMMENDATION E.205

CHARGING FOR CALLS FROM OR TO A PUBLIC CALL OFFICE

The establishment of a station call from or to a public call office entails special expenses, but these special expenses are negligible in comparison with the other costs involved in the establishment of an international call.

It is therefore preferable not to collect a supplementary charge for the use of a public call office for an international call, but, notwithstanding, the Administrations * which collect a supplementary charge in their national services may apply such a supplementary charge to international calls, it being understood that this supplementary charge is not included in the international accounts.

RECOMMENDATION E.206 [1]

STANDARDIZATION OF THE HOURS OF LIGHT TRAFFIC FOR THE PURPOSE OF APPLICATION OF CHARGES

1. The hours adopted by all Administrations * as limits between periods of heavy traffic and periods of light traffic should be uniform;

2. The times uniformly adopted for these limits should be 19.00 and 8.00 (legal time in the country of origin).

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* or recognized private operating Agency (or Agencies).

[1] As the times given for the limits in the Recommendation may not be applicable in all regions of the world, this aspect is under study in Question 10/III in the 1968-1972 study period.

RECOMMENDATION E.207

DEFAULTING SUBSCRIBERS

1. It is in the interest of Administrations * to know of telephone subscribers coming from a country where they have not settled their telephone accounts, and also to render each other assistance in the recovery of amounts due from such debtors.

2. In view of the differences in the law in different countries, it would be very difficult to regulate this assistance.

3. It is therefore recommended that when a telephone subscriber has left the country in which he was a subscriber without settling his telephone account, and has taken up residence in another country which is known, the Administration * of the country of origin should advise the Administration * in the other country and ask this latter, on a reciprocal basis, to take such steps or make such arrangements as it thinks fit to obtain payment of the accounts outstanding.

4. The minimum amount of unpaid telephone bills, for the recovery of which the assistance of another Administration * is requested, should be 100 gold francs. Any such request for assistance should be made within two years from the date on which the unpaid telephone bill was submitted.

One Administration * may appeal to another in special cases even when the amount owed is less than 100 gold francs; for example, if a punishable offence is involved and it is considered necessary for reasons of principle to recover the debt.

* or recognized private operating Agencies.

CHAPTER II

CONTINENTAL TELEPHONE CHARGES

RECOMMENDATION E.230

CONTINENTAL TELEPHONE CHARGES [1]

1. Article 27 of the Telephone Regulations (Geneva, Revision 1968) stipulates that the charges for international telephone calls are normally made up of terminal charges accruing to the Administrations * of origin and of destination (terminal Administrations *) and of transit charges accruing to intermediate Administrations * if any (transit Administrations *), the territory of the terminal Administrations * being divisible into zones for charging purposes, and a uniform charge being adopted for a given zone.

2. Administrations * should take into account:

— the following directives (see section I) for the determination of international telephone charges,

— the elements for basis of charges for calls (see section II) set up on international circuits,

when, in their full sovereignty, they negotiate between themselves agreements as to the telephone charges to be applied in their services.

SECTION I

Directives for the calculation of international telephone charges with circuits of the European continental type

1. The charges for international telephone calls are calculated according to the crow-flight distance, taking as a basis the net cost.

2. *Charging zones.* — For calculating terminal charges, each country may be divided into charging zones. If need be, different charging zones may be fixed in a given country for traffic exchanged with different countries.

It is desirable that the number of charging zones for international traffic, in any one country, should be reduced to a minimum. As a general rule, in services between non-adjacent countries, each country should constitute one single zone, provided no difficulties or anomalies in the establishment of tariffs would ensue.

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* or recognized private operating Agencies.

[1] In principle, this Recommendation applies only to the European continent. At the meetings of the IVth C.C.I.T.T. Plenary Assembly in Mar del Plata, the opinion was expressed by various European delegations that the values of the elements for basis of charges of this Recommendation were to be regarded as out of date. Therefore an urgent question 11/III is to be studied by the C.C.I.T.T. during the present study period. This study is necessary in order to determine the international accounting rates (including those for the application of Recommendation E.250 and to determine the components to be taken into consideration in fixing international collection charges. Similar studies are to be made for the African, Asian and Latin American regions.

In fact, a reduction in the number of charging zones, by simplifying charges, facilitates the calculation, by the operation services, of the charges applicable to the various types of calls and the settlement, by the accounting services, of international accounts. It is even more desirable that each country should constitute but one single charging zone when automatic international operation is in use and charges are recorded on the same devices as are used for national charges (including devices which may be installed in subscribers' premises to indicate charges).

All the international terminal exchanges should have detailed and up-to-date records showing, for the different countries with which telephone service is available, the charging zones to which the different localities, with which telephone service is open to the public, belong. With the aid of such records a large number of requests for information between operators, which occupy circuits unnecessarily, are avoided and the number of queries at the time of settlement of the international accounts is reduced.

3. *Terminal charge.* — The terminal charge for a charging zone in any country is calculated as a function of the distance between:

a) a point chosen as the " mean charging point of that zone ". This mean point is left to be fixed by each Administration * on its own evaluation. In doing so the Administration * may take into account:
   — the distribution of traffic,
   — the lay-out of its national network,
   — the routing of the international circuits which serve the charging zone under consideration, and

b) the point where the international circuits cross the frontier of the country, or, in the case where several frontier crossing points exist, a mean point representative of the various crossing points.

(Where the frontier is crossed by microwave radio-relay link, in order to take account of the division of net costs, a point midway between the two radio-relay stations situated on either side of the frontier may be chosen instead of the exact point where the radio-relay system crosses the frontier.)

4. *Transit charges.* — The transit charges applied by the Administrations * of the intermediate countries through which the circuits pass are calculated, for each transit country, according to the average crowflight distance between the points of entry and exit of the international circuits.

(Where the frontier is crossed by microwave radio-relay link, in order to take account of the division of net costs, a point midway between the two radio-relay stations situated on either side of the frontier may be chosen instead of the exact point where the radio-relay system crosses the frontier.)

5. *Notes about terminal and transit charges.* — In the case of mountainous countries, or countries with a peculiar geographical configuration, in which the actual route followed by the circuits is inevitably very circuitous, the distance on which the terminal charge is calculated may be appreciably greater than the straight-line distance between the frontier and the point in the zone in question which is the most distant measured on a crowflight

* or recognized private operating Agencies.

basis; in the same way, in a mountainous country or one having an exceptional configuration, the crowflight distance between the points of entry and exit on which the transit charge is based, may be increased.

If there is a submarine section, the quota relative to the section should be agreed between the Administrations * concerned, taking into account the annual charges (including interest, depreciation and maintenance).

SECTION II

Elements for basis of charges for calls set up on international circuits of the European continental type

The C.C.I.F.[1] and the C.C.I.T.T. have made various studies of the net costs of calls set up on international circuits:

— in 1935, study of the net cost of telephone calls established over the European circuits then used (symmetric, coil-loaded pairs equipped with repeaters and operated at voice frequencies only);

— in 1949, study of the net cost of telephone calls established over carrier current systems on symmetric pairs in cables or on bare-wire overhead lines, giving at least twelve telephone circuits;

— in 1954, study of the net cost of telephone calls established over carrier current systems on coaxial pairs;

— in 1956, study of the net cost of telephone calls established by means of microwave radio-relay links and study of the net cost of calls with semi-automatic operation;

— in 1960, study of the net cost of switching equipment used to establish automatic telephone calls.

The bases of the various studies were as follows:

1935 Study (voice-frequency circuits):

— average traffic carried per circuit: 200 minutes at the full charge per working day and 300 working days per year, i.e. 60 000 chargeable minutes per year;

— proportion of reserve circuits in underground cables: an average of 40% (that is, 60 working circuits and 40 spare circuits for 100 circuits);

— interest on capital invested: 6%;

— average life of an underground cable: 35 years;

— average percentage difference between the actual length of international telephone circuits and the crowflight distance: 30%.

1949 Study (carrier current systems on symmetric pairs or on bare-wire overhead lines):

— average traffic carried per circuit: 180 chargeable minutes at the full charge per working day and 300 working days per year; i.e. 54 000 chargeable minutes per year[2];

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* or recognized private operating Agencies.

[1] Succeeded by the C.C.I.T.T. in 1957.

[2] At the time the 1956 studies were made, the net costs for carrier current systems on symmetric pairs were re-calculated, taking into account the same use of circuits as for the studies on coaxial cable pairs or on microwave radio relay links, i.e. 40 000 chargeable minutes per year.

— proportion of spare capacity:
  — an average of 40% of the conductors in underground cables (that is, 60 working conductors and 40 spare conductors per 100 conductors);
  — an average of 20% of terminal equipments (that is, 80 working equipments and 20 spare equipments per 100 equipments);
— interest on invested capital: 5%;
— average life of an underground cable: 30 years;
— average life of terminal equipment: 15 years;
— percentage difference between the actual length of international telephone circuits and the crow-flight distance: 30%.

1956 Study (carrier current systems on coaxial cable pairs or on microwave radio-relay links):

(circuits operated on a semi-automatic basis):

— average traffic per circuit: 135 chargeable minutes at the full charge per working day and 300 working days per year, i.e. 40 000 chargeable minutes per year;
— proportion of spare capacity:
  — an average of 20% of terminal and automatic equipments (that is, 80 working equipments and 20 spare equipments per 100 equipments);
— interest on invested capital: 5%;
— average life:
  — of a coaxial cable: 30 years;
  — of aerials and radio equipment: 10 years;
  — of terminal equipment: 15 years;
  — of automatic equipment: 15 years;
— percentage difference between the actual length of international telephone lines and the crowflight distance: 30%.

1960 Study (switching equipment used to establish automatic telephone calls):

— average traffic per circuit: $113^1/_3$ minutes of *actual call duration* at the full charge per working day and 300 working days per year, i.e. 34 000 minutes *actual call duration* per year;
— proportion of spare capacity: an average of 20% of automatic equipments (that is, 80 working equipments and 20 spare equipments per 100 equipments);
— interest on invested capital: 5%;
— average life of switching equipment: 10 years.

As a result of these various studies, the C.C.I.T.T. has fixed the following elements as a basis for the calculation of charges for calls set up on international telephone circuits. All values given in the following text are given again in a tabular summary at the end of the present Recommendation.

These elements for basis of charges take account of general overhead costs (accounting costs, administrative costs, research costs, etc.) but not of the extension of international calls on the national (local or trunk) network beyond the international exchange.

A. FRONTIER RELATIONS

Maximum frontier charge per 3-minute call:

0.60 gold franc for crowflight distances less than 25 kilometres,
1 gold franc for crowflight distances between 25 and 50 kilometres.

The distance is measured between exchanges covering a specified geographical area on each side of the frontier; these exchanges are defined by agreement between Administrations * in the light of the structure of their national networks.

Note. — If Administrations * have their own reasons for preferring either a single charging rate or more than two charging rates for frontier relations, it is for them to make special arrangements to this effect.

B. OTHER RELATIONS

The C.C.I.T.T. considers that a distinction should be made between three conditions in the development of existing communication channels:

a) **Old conditions.** — In certain relations no carrier current telephone systems are in use; calls are still set up over old type circuits, coil-loaded and equipped with repeaters, or over bare-wire overhead lines worked at voice frequencies. In these relations, the values determined in the 1935 study can still be applied.

Costs of depreciation, interest on capital involved and maintenance of the international circuit (excluding any inland trunk circuit required to connect the international terminal exchange with the trunk exchange serving the subscriber):

0.60 gold franc per 3-minute call and per 100 kilometres of crowflight distance (each fraction less than 50 kilometres being rounded up to a maximum of 50 kilometres and each fraction between 50 and 100 kilometres being rounded up to a maximum of 100 kilometres).

Note. — The studies carried out in 1935 showed that, in short-distance services (up to about 300 kilometres) in which traffic is routed over direct circuits, the portion of the net cost of the call proper to the international circuits is appreciably less than 0.60 gold franc per 100 kilometres.

Operating costs of an international exchange:

0.60 gold franc per 3-minute call (both terminal and transit exchanges).

b) **Modern conditions.** — The great majority of calls are set up over high-speed transmission lines with modern type carrier routes (metallic lines or radio-relay links) for which the studies of the net cost carried out in 1949 and 1956 are valid.

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* or recognized private operating Agencies.

As a result of these studies, the basic elements of charges to be taken into account for the calculation of international telephone charges should be as follows:

Cost of depreciation, interest on capital involved, and maintenance of the international circuit (excluding any inland trunk circuit required for connecting the international terminal exchange with the trunk exchange serving the subscriber):

0.25 gold franc per 3-minute call and 100 kilometres of crowflight distance (any fraction less than 50 kilometres to be rounded up to a maximum of 50 kilometres and any fraction between 50 and 100 kilometres to be rounded up to a maximum of 100 kilometres).

Operating expenses of an international terminal exchange, including terminal equipments of the carrier system:

1. Manual and semi-automatic operation: per 3-minute call (3 minutes + 1 minute method of charging):

— per international manual exchange (whether an international terminal exchange or a transit centre)	0.80 gold franc
— per outgoing international semi-automatic exchange	0.80 gold franc
— per incoming international automatic exchange	0.30 gold franc
— per transit international automatic exchange	0.45 gold franc

2. Automatic operation per 3 minutes of *actual call duration:*

— per outgoing international automatic exchange	0.50 gold franc
— per incoming international automatic exchange	0.30 gold franc
— per transit international automatic exchange [1]	0.45 gold franc

c) **Transitional conditions.** — In certain international relations, a transition stage has been reached, in which old and new type circuits co-exist; the amount of 0.25 gold franc per 3-minute call and per 100 kilometres of crowflight distance intended to cover costs of depreciation, interest on capital involved and maintenance of the circuit concerned, should provisionally be increased to 0.40 gold franc, until the route uses modern type circuits. The values, shown in b) above, for the operating expenses of an international exchange are applicable in these transitional conditions.

[1] *Remuneration for the use of a transit international automatic exchange*

If all the traffic between two terminal countries is routed through a transit country either wholly or partly via a transit international automatic exchange, no remuneration is allowed for the use of the transit exchange.

If, however, only part of the traffic between two terminal countries is routed through a transit country via a transit international automatic exchange, then the remuneration of 0.45 gold franc should be taken into account in fixing the hypothetical charge for the country with a transit international automatic exchange.

TABULAR SUMMARIES OF THE ELEMENTS OF THE COST TO BE TAKEN INTO CONSIDERATION IN THE CONDITIONS INDICATED

TABLE I

Manual and semi-automatic operation: per 3-minute call
(3 minute + 1 minute method of charging)

Tabular summary of the elements for basis of charges to be taken into account in the conditions indicated

	Old conditions (case a)	Modern conditions (case b)	Transitional conditions (case c)
per 100 km of circuit	0.60	0.25	0.40
per international exchange [1]			
— manual	0.60	0.80	0.80
— outgoing semi-automatic	—	0.80	0.80
— incoming automatic	—	0.30	0.30
— transit automatic	—	0.45	0.45

TABLE II

Automatic operation: per 3 minutes of actual call duration

	Modern conditions (case b)	Transitional conditions (case c)
per 100 km of circuit	0.25	0.40
per outgoing international automatic exchange [1]	0.50	0.50
per incoming international automatic exchange [1]	0.30	0.30
per transit international automatic exchange [2]	0.45	0.45

[1] It is to be understood that the elements of calculation applying to outgoing and incoming international exchanges take no account of the use which may be made of any national circuit or exchange to connect the international exchange concerned to the calling or called subscribers.

[2] See footnote on preceding page.

REMARK

When Administrations *, in their full sovereignty, negotiate between themselves agreements with a view to reduction in the charges (in gold francs) in force, they should take into consideration the suggestions below:

1. When envisaging a reduction of the charge applied in a telephone service, it is necessary to make sure that a sufficient number of circuits will be available to deal with additional traffic which may result from this reduction in charge.

* or recognized private operating Agencies.

2. It would be advisable for unit quotas (in gold francs) indicated in international accounts to be exactly divisible by three. This would enable quotas per minute to be expressed without recurring decimals.

3. In order to change from the old conditions (case a) to the transitional conditions (case c), it is sufficient if, in the international service concerned (case of a service between adjacent countries, that is to say without transit), about 50% of the circuits are of the modern type.

If in the service concerned, one or several transit countries are involved, it will be desirable to initiate discussions with a view to reducing the charges when all the Administrations * concerned have put into service on this route about 50% of the modern type international circuits.

4. If it happens that, in the case of an international route to be set up between neighbouring countries, one of the countries has completed the section on its territory before the other country has done the same, the first country has the right to maintain its quota at the amount determined under the old conditions in the table until the second country has completed its part of the project. If, on the other hand, in order to increase traffic, the second country agrees to reduce its quota, reduction in charges could be envisaged, because each country will have made its share of the sacrifice towards the reduction.

5. The Administrations * should agree between themselves as to the principles to be adopted when:

— a particular service is operated on a different basis (manual, semi-automatic or automatic) in one direction and in the other;

— in a particular service and in a given direction of operation, circuits operated manually, semi-automatically or automatically are used at the same time.

Note 1. — The Administrations * concerned should enter into direct correspondence with one another for the application of the above suggestions.

Note 2. — The standards in the table above do not apply to countries in which the telephone system is less developed.

RECOMMENDATION E.231 [1]

UTILIZATION, BY PUBLIC SERVICES, OF CONTINENTAL TELEPHONE CONNECTIONS WHICH ARE THEIR PROPERTY (EUROPEAN TYPE)

(This Recommendation applies to continental telephone connections set up by undertakings for the generation and distribution of electric power and to continental telephone connections set up on railway property, provided that these telephone connections are constructed and operated by the public services concerned.)

1. It has been noted: that private continental telephone connections can be indispensable to certain public services (the term "public service" includes not only state services but also organizations providing services of general interest, such as those generating and distributing electric power, etc.);

* or recognized private operating Agencies.

[1] In principle, this Recommendation applies only to the European Continent.

that, nevertheless, these continental telephone connections permit the exchange of conversations outside the general public telephone service, which constitutes a certain privilege;

that, in consequence, this justifies some control of the use made of these circuits and also requests for compensation for their use.

2. It is therefore recommended that Administrations * which authorize the establishment and use of private continental telephone connections for a public service (connections set up and operated by the public service) should be guided by the following principles:

2.1 The use of private continental telephone connections should be made the subject of an agreement between the proprietors of the different sections of the connections on the one hand, and between the Administrations * of the countries over whose territories the sections are constructed, on the other hand.

2.2. The public services authorized to use these private continental telephone connections should agree to exchange over them only messages relating exclusively to their business and never to permit their use by third parties.

2.3. Technical limitations (regulations relating to the installations, authorized types of apparatus) should be imposed in order to prevent such continental telephone connections obtaining access (directly or indirectly) to the lines and circuits of the general telephone network.

2.4. The Administrations * concerned reserve the right to exercise, by any suitable means, all technical or other controls which they consider desirable.

2.5. The Administrations * concerned always reserve the right to withdraw the authority to use such connections if abuses occur or if a superior interest justifies it.

2.6. In order to compensate Administrations * to some extent for the loss of revenue resulting from the privilege granted to the users of such private continental telephone connections, the Administrations * concerned will charge a minimum annuity of 12 gold francs per kilometre of circuit used on their own territory, the payment of this annuity falling upon the proprietors of the circuits used. Each Administration * will itself determine the length of the circuits to be taken into consideration, taking account of the point where the circuit crosses the frontier and the point or points from which the circuit(s) can be used.

Note. — In the event of a case occurring of a group of circuits constituting a real telephone network over an extensive territory, to meet the needs of a particular public service, it is desirable that this service should send to all the Administrations* concerned a plan of the network showing the various centres of activity of this public service and the telephone switching exchanges.

* or recognized private operating Agencies.

RECOMMENDATION E.232

MULTIPLE CALLS [1]

Multiple calls should be accepted in the international service, by agreement between the Administrations * concerned, subject to the following conditions:

1. *Conditions of acceptance*

In all cases the technical equipment should be such as to provide satisfactory transmission of multiple calls.

2. *Charging*

The charge for a multiple call should include the main charge and any subsidiary charges.

The main charge shall be calculated on the basis of the charge applicable to relations between the national exchange, chosen as controlling exchange for the call, and the various international exchanges intervening in the call, regardless of the number of correspondents.

The subsidiary charges shall be fixed by each country concerned, taking into account:

a) any internal circuits used beyond the international exchange;

b) equipment expenses in telephone exchanges for the setting-up of multiple calls.

The total charge for a multiple call, calculated by agreement between the Administrations * of the countries concerned, shall be collected exclusively from the party who requested the multiple call.

The main charge is apportioned between the Administrations * of the countries concerned in accordance with the rules applicable to ordinary calls. The subsidiary charges are attributed to each of the Administrations * concerned.

* or recognized private operating Agencies.

[1] This Recommendation is not applicable to the intercontinental service; however, Study Group II has recognized that this Recommendation is insufficient and therefore Question 6/II has been accepted for study during the 1969-1972 period.

CHAPTER III

INTERNATIONAL TELEPHONE ACCOUNTING

RECOMMENDATION E.250

NEW SYSTEM FOR ACCOUNTING IN INTERNATIONAL TELEPHONY

1. *Introduction*

1.1 The introduction of automatic and semi-automatic operation entails the use of alternative and overflow routings which make it impracticable to follow the path of a telephone call without considerable technical complication.

1.2 In order to avoid complicating too much the technical equipment required—and thereby raising its cost—new procedures are required so as to eliminate the need to know the path of every call as the basis for accounting in international telephony.

1.3 There is also the situation in certain international relations whereby Administrations * purchase or lease direct transit circuits for the handling of their traffic.

1.4 The following procedures to meet these new situations and improve the efficiency of the world telephone network are valid, above all, for semi-automatic and automatic operation. They can be applied on relations operated manually, subject to agreement between the Administrations of all the countries concerned.

1.5 These procedures introduce the new concept of remunerating the Administrations * of countries of destination and transit countries for making facilities available for use by Administrations of countries of origin.

1.6 Annex 1 provides the explanation of terms used in this Recommendation.

2. *Basic principles for a new system for accounting in international telephony*

2.1 The remuneration of the Administration * of transit countries (direct transit or switched transit) should not depend upon the procedure selected by the terminal Administrations * for their remuneration for accounting. That is, the different procedures affect only the remuneration of terminal Administrations *.

2.2 As regards the remuneration of the Administrations * of the countries of destination and transit countries, it is preferable to make no distinction between automatic and semi-automatic traffic when establishing international accounts. This is in line with the

* or recognized private operating Agency (or Agencies).

idea that Administrations should be remunerated on the basis of the facilities made available. Whilst expenses of setting up calls in these two cases are different in countries of origin, they are approximately the same in the countries of destination and transit countries.

2.3 It is preferable, in order to simplify accounting, that one procedure or the other be used to the greatest possible extent. Certain regions may find it expedient to select one of the procedures for use within their region.

A. Remuneration of the Administrations * of countries of destination

3. *Procedures*

The remuneration of the Administrations * of *countries of destination* will be based either on:

3.1 The procedure whereby the Administration * of the country of origin keeps its revenue and remunerates the Administration of the country of destination for the facilities made available, including the international circuit, the international exchange and the national extension [1]:

3.1.1 either on the basis of a flat-rate price per circuit (called the flat-rate price procedure), or

3.1.2 on the basis of traffic units carried (called the traffic unit price procedure).

3.2 The procedure whereby accounting revenue is shared between terminal Administrations * (called the accounting revenue division procedure).

3.3 The prices referred to under 3.1.1 and 3.1.2 will be fixed by the Administration * of the country of destination.

4. *Flat-rate price procedure*

4.1 Under this procedure the Administration * of the country of destination receives payment for the facilities made available by a flat-rate price fixed by it as a price per circuit. The price per circuit would cover:

4.1.1 the international circuit section provided by the country of destination;

4.1.2 the use of its international exchange;

4.1.3 the national extension [1].

4.2 In fixing these flat-rate prices, the Administrations * of countries within a region may find it desirable to follow the principles in C.C.I.T.T. Recommendations [2].

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* or recognized private operating Agency (or Agencies).

[1] This element will have due regard to the location of the international exchange and the distribution of the international traffic within the country of destination.

[2] These Recommendations have to be drafted during the 1968-1972 C.C.I.T.T. study period.

5. *Traffic unit price procedure*

5.1 Under this procedure, the country of destination receives payment on the basis of the price fixed by it per traffic unit. This price will be related to the facilities made available and which will take account of:

5.1.1 the international circuit section provided by the country of destination;

5.1.2 the use of its international exchange;

5.1.3 the national extension [1].

5.2 In fixing these traffic unit prices, Administrations * of countries within a region may find it desirable to follow the principles in C.C.I.T.T. Recommendations [2].

6. *Accounting revenue division procedure*

6.1 Under this procedure, the accounting revenue from the traffic exchanged in their relationship is divided between the Administrations * of the terminal countries, in principle on a 50/50 basis. Proportions other than 50/50 may be used when the facilities made available by each of the Administrations * of the terminal countries are not approximately equivalent.

6.2 The Administration * of each terminal country in principle pays half of any remuneration due to the Administrations * of transit countries.

7. *Consideration regarding choice of accounting procedure*

7.1 The accounting revenue division procedure is particularly appropriate when there is a significant volume of traffic exchange or when operation is over both-way circuits [3] as in the case of certain intercontinental traffic relations. The establishment of accounts for collect and credit card calls may be easier under the accounting revenue division procedure.

7.2 On the other hand, other accounting procedures are more appropriate when:

7.2.1 the volume of traffic exchanged between terminal countries is light, as is the case when all traffic is handled only by switched transit;

7.2.2 there is one-way operation on all the international circuits [3] concerned.

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* or recognized private operating Agency (or Agencies).

[1] This element will have due regard to the location of the international exchange and the distribution of the international traffic within the country of destination.

[2] These Recommendations have to be drafted during the 1968-1972 C.C.I.T.T. study period.

[3] Remark on one-way and both-way circuit operation:

Actual circuit operation should not be confused with the possibilities of operating such circuits as signalling systems may offer. Even though the circuits between the terminal countries have a signalling system permitting both-way operation, it is common practice, when the volume of traffic is large enough, to split the both-way circuit groups into three groups, two of which are operated on a one-way basis, the third, operated on a both-way basis, being used for overflow from the first two.

8. *Simplification of accounts and use of traffic sampling*

8.1 In certain conditions, the Administrations * of terminal countries may agree not to exchange international accounts when, for example:

8.1.1 the balance of settlement of their accounts is normally negligible;

8.1.2 the *terminal countries'* traffic levels in both directions are more or less equal;

8.1.3 there is approximate equivalence as regards their national extensions [1].

8.2 Traffic sampling may be used for the establishment of international accounts when the countries involved in a given traffic relation so agree. This sampling may then avoid the necessity for continuous traffic measurements. For example, the samples could cover five working days and could be taken at regular intervals (e.g. one to four times a year) or could be samples taken on the occasion of any significant change in the number of circuits in the given relation. Sampling is particularly useful when traffic in any international relationship is reasonably stable.

B. Remuneration of the Administrations * of transit countries

9. *Procedures*

It is considered that the facilities made available should form the basis of the remuneration of transit Administrations * and there are two alternatives for the remuneration of transit Administrations *:

9.1 by flat-rate prices per circuit (called the flat-rate price procedure;

9.2 by payments related to traffic units carried (called the traffic unit price procedure).

10. *Flat-rate price procedure*

10.1 Under the flat-rate price procedure, the terminal Administrations * will ensure that the best possible use is made of the circuits because if those Administrations:

10.1.1 provide too few circuits, they pay the penalty in the form of the lower quality of service they offer to their subscribers;

10.1.2 provide too many circuits, they will have to pay more in remuneration and will be penalized financially.

10.2 To this end it is recommended that in the case of direct transit via other countries the Administrations * of these direct transit countries should be remunerated for the exclusive use of the facilities made available on the basis of a flat-rate price per circuit.

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* or recognized private operating Agencies.

[1] This element will have due regard to the location of the international exchange and the distribution of the international traffic within the country of destination.

10.3 The flat-rate price is fixed by the Administration * of the transit country. In fixing these flat-rate prices, the Administrations * of countries within a region may find it desirable to follow the principles in C.C.I.T.T. Recommendations regarding the establishment of recommended values for facilities provided.

11. *Traffic unit price procedure*

11.1 When transit traffic is not handled on direct circuits, the remuneration for the transit routing in the case of traffic passing by switched transit through one or more countries should be made to the Administration * of the country of the first transit exchange used, which fixes a price per unit of traffic handled on the basis of the shared usage of its facilities. This price should also include the remuneration to the Administrations * of other transit countries if any, and to the Administration * of the country of destination where appropriate.

11.2 The procedure of remuneration to the Administration * of the country of the first transit exchange for the entire routing of the traffic to the country of destination (remuneration of the first transit exchange) is necessary to meet the situation where traffic may be routed through subsequent transit exchanges, each of which, under automatic operation, will be unable to identify the country of origin of the traffic.

This procedure makes the source of the traffic irrelevant for the establishment of accounts. Depending on the accounting methods in force between Administrations *, the remuneration of the first transit centre may or may not include payments for use of the facilities of the country of destination.

12. *Establishment of a switched transit relation*

12.1 Before switching traffic via a transit exchange, the Administration * of the country of origin will request the country in which the first switching transit exchange is situated for a price quotation per transit traffic unit to the country of destination.

12.2 The Administration * of the country to which the first transit exchange belongs advises the price per traffic unit (minute of call or minute of holding time) for handling the traffic from the transit exchange to the country of destination, including remuneration of the latter country where appropriate. This price may be set by the Administration of the country to which the transit exchange belongs on the basis either of a special study or of a price already fixed for the transit routing to the same terminal country of traffic originating in other countries.

12.3 The Administration * of any country with traffic * to be routed in transit may, of course, find it advisable to consult the Administrations * of several countries to ascertain which transit routing is the most economical.

12.4 The consultations by the Administration * of the country of origin regarding the transit routing (by switching) of its traffic should be in accordance with the principles of the International Routing Plan described in Recommendation E.171.

13. *Calculation of the remuneration to the Administration * of the country of the first transit exchange on the basis of traffic units*

13.1 Remuneration to the Administration * of the switched transit country depends on the number of traffic units handled by its transit exchange.

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13.2 For the establishment of international accounts, the Administration * of the country of origin should measure the volume of traffic (expressed in the same traffic units as chosen under paragraph 12.2 routed each month towards each country of destination through this transit exchange.

13.3 An alternative version of this system can be contemplated when the traffic to the country of destination routed via a given international transit centre is sufficiently stable; the Administrations * of the country of origin and of the country where the first transit exchange is situated might then agree to settlement on the basis of an estimated number of traffic units determined by means of traffic sampling and subject to periodic revision (e.g., one to four times a year).

C. Notes and examples

To assist in an understanding of the new procedures, the following four annexes deal with:

Annex 1: Explanation of terms used in international telephone accounting;

Annex 2: Differences between collection charges and accounting rates;

Annex 3: Example of the use of the accounting revenue division procedure;

Annex 4: Example where the accounting revenue division procedure is *not* used.

ANNEX 1
(to Recommendation E.250)

Explanation of terms used in international telephone accounting

1. *(Telephone) relation*

A (telephone) relation between two terminal countries exists when there is between them an exchange of telephone traffic (and, normally, a settlement of accounts).

2. *Country (or Administration, etc.) of origin*

The country of origin is the country in which the calling subscriber is located.

3. *Country (or Administration, etc.) of destination*

The country of destination is the country in which the called subscriber is located.

4. *Terminal country (or Administration, etc.)*

A terminal country is both a country of origin and a country of destination in a given relation.

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* or recognized private operating Agency (or Agencies).

5. *Transit countries (or Administrations, etc.)*

5.1 A transit country is a country through which traffic is routed between two terminal countries.

5.2 *Direct transit country.* — A direct transit country is one through which traffic is routed on direct circuits, i.e. on circuits provided for the exclusive use of other countries.

5.3 *Switched transit country.* — A switched transit country is a transit country through which traffic is routed by switching in an international transit exchange.

6. *International circuits*

6.1 A circuit between two international exchanges situated in different countries is called an " international circuit " (*circuit international*).

6.2 A " continental circuit " (*circuit continental*) is an international circuit between two international exchanges situated in two different countries in the same continent.

6.3 An " intercontinental circuit " (*circuit intercontinental*) is an international circuit between two international exchanges on different continents.

7. *National extension*

A national extension is that part of the connection which extends from the national side of the international exchange to the subscribers.

8. *Remuneration for shared use and exclusive use*

8.1 *Remuneration for shared use of circuits and equipment.* — The expression " remuneration for shared use " refers to the remuneration paid to the Administration * of a country P which makes its facilities available to a number of Administrations * of other countries L_1, L_2, ... L_n for the routing of different international traffic streams. It may apply either to circuits or to switching equipment. Under the control of the owner, the use of such facilities may be shared in any appropriate manner with other Administrations * (including the Administration * which owns them). The latter sets the price for the shared use of its facilities:

8.1.1 either according to the number of traffic units;

8.1.2 or by a fixed amount covering a certain period of time and based on the estimated volume of traffic and its time characteristics.

8.2 *Remuneration for exclusive use of circuits*

8.2.1 The remuneration for exclusive use is the remuneration paid to the Administration * of a country which makes its circuits available for direct transit, each circuit being assigned on an exclusive basis. The volume of traffic, its origin and its fluctuations in time are not the concern of the owner Administration * and have no effect on the amount of the remuneration, which is paid circuit by circuit. The owner does not control the traffic routed over the circuit. This is the conventional lease arrangement between Administrations *.

8.2.2 For further clarification, it should be mentioned that:

a) the general term " lease " (location) used until now applies only to the case cited in 8.2.1 where exclusive use is granted;

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* or recognized private operating Agency (or Agencies).

b) the term " owner " in those definitions refers to an Administration * which receives the remuneration and which grants the rights to another Administration *. The owner may have real ownership or the indefeasible right of use of the facilities.

9. *Accounting rate*

The accounting rate is the rate per traffic unit agreed between the Administrations * in a given relation which is used for the establishment of international accounts.

10. *Collection charge*

The collection charge is the charge collected by an Administration * from its public for the use of the international telephone service. The establishment of that charge is a national matter.

11. *Flat-rate price (per circuit) procedure*

The flat-rate price procedure is a procedure which consists of remunerating an Administration * on the basis of a flat-rate price per circuit.

12. *Traffic unit price procedure*

The traffic unit price procedure is the procedure whereby remuneration of an Administration * is based on traffic units.

13. *Accounting revenue division procedure*

The accounting revenue division procedure is the procedure whereby accounting revenue is shared only between terminal Administrations *.

ANNEX 2
(to Recommendation E.250)

Differences between collection charges and accounting rates

1. The collection charge is the charge collected by an Administration * from its public for the use of the international telephone service.

2. The accounting rate is the rate per traffic unit agreed between Administrations * in a given relation, which is used for the establishment of international accounts.

3. Whilst, in general, Administrations correlate collection charges and accounting rates, the two cannot always be the same because, for example:

3.1 In most countries collection charges and accounting rates will be expressed in different currencies;

3.2 Collection charges and accounting rates may be based on different traffic units;

3.3 The value of national currencies can fluctuate relative to the gold franc;

3.4 Collection charges may be influenced by government fiscal policies.

4. As a general principle, in fixing the collection charges Administrations * should make every effort to avoid too large a dissymmetry between the charges applicable in each direction of the same relation.

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* or recognized private operating Agency (or Agencies).

ANNEX 3

(to Recommendation E.250)

Example of the use of the accounting revenue division procedure

1. *General*

1.1 The accounting revenue division procedure is based on the assumption that there is agreement between the terminal Administrations *.

1.2 The detailed description of the use of the accounting revenue division procedure is made with reference to a typical traffic pattern, as shown in the Figure below.

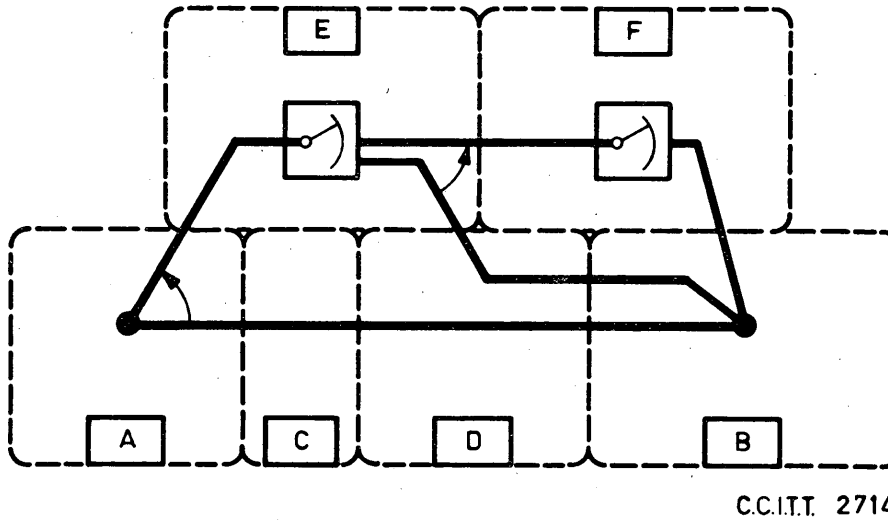

FIGURE 1

2. *Direct transit circuit*

2.1 In accordance with the accounting revenue division procedure, the Administrations * of countries A and B each pay half of the remuneration due to the Administrations * of the direct transit countries C and D for the use of the circuit sections traversing these countries. No payment is made for the facilities in country A or for those in country B.

2.2 Remuneration to the Administrations * of the direct transit countries C and D is based on a unit price per circuit and calculated according to the (crowflight) length of the circuit sections on the territory of countries C and D.

3. *Switched transit traffic handled by the exchange in E*

3.1 The remuneration to the Administration * of country E for traffic routed from A to B by switched transit at the exchange E is paid by the Administration * of country A. The Administration * of country E receives from the Administration * of country A a payment calculated from the number of traffic units passed during the month to country B on behalf of the Administration * of country A.

Since the accounting revenue division procedure implies that each of the Administrations * of the terminal countries A and B pays half of the renumeration due to the Administrations *

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of the transit countries, irrespective of whether these are switched transit or direct transit countries, half of the remuneration paid by the Administration * of country A to the Administration * of country E must be debited in the statement of revenue divided between the Administrations * of countries A and B.

3.2 The Administration of country E fixes the price to be paid by the Administration of country A per unit of traffic between the transit exchange E to country B; the Administration * of country E must take into consideration:

— its expenses on its own territory;

— the expenses incurred for the direct transit circuit EB through country D;

— the expenses for switched transit after overflow in E through the transit exchange in country F.

In determining expenses in its own territory, E should include expenses for the circuits from the frontier of AE to transit exchange E as well as its switching expenses.

On the other hand, the Administration of country E must not take into account the expenses of the sections of international circuits provided by the Administration * of country B or of the national extensions in that country. These expenses are allowed for in the accounting revenue sharing between the Administrations * of country A and country B.

ANNEX 4

(to Recommendation E.250)

Example where the accounting revenue division procedure is not used

(for the traffic situation outlined in the Figure in Annex 3)

1. *Traffic on direct circuits*

1.1 *Remuneration to the Administrations * of direct transit countries*

The Administration * of the country of origin A remunerates each of the Administrations * of the countries C and D for use of the sections of circuit AB. Remuneration is based on a flat-rate price per circuit and is calculated according to the (crowflight) length of the circuit sections.

1.2 *Remuneration of the country of destination*

The Administration * of the country of origin A should remunerate the Administration * of country B:

— for the circuit section AB provided by the Administration * of country B;

— for the use of the international exchange in B;

— for the national extensions in country B.

Depending on the agreements concluded by the Administrations * of countries A and B, the remuneration is based:

a) either on a flat-rate price per circuit, or

b) on the traffic unit price.

1.3 *One-way operating and both-way operating*

In the case of one-way circuits the remuneration of an international circuit by the Administration * of a country of origin presents no difficulty. In the case of both-way circuits,

* or recognized private operating Agency (or Agencies).

the Administrations * of the terminal countries A and B decide how the costs of the international circuits are to be divided after taking account of the outgoing traffic of each.

2. *Switched transit traffic handled by the exchange E*

2.1 *Remuneration for circuits in the group AE*

With respect to the traffic transiting the transit exchange in country E, the Administration * of country A first of all remunerates the Administration * of country E for the use of the section of the circuit AE provided by the Administration of country E.

This remuneration is normally independent of the traffic in transit to country B, because the circuits AE are used not only for traffic in transit to country B but also for terminal traffic from country A to country E. This is the case when the remuneration paid by the Administrations * of countries A and E for terminal traffic between them is based on the flat-rate price procedure.

When the remuneration paid by the Administrations * of countries A and E for terminal traffic between them is based on the traffic unit price procedure, i.e. on the measurement of all traffic routed over the circuits AE, a meter could be used to measure the whole of the traffic sent from A to E on the circuits AE, regardless of the destination (i.e. regardless of the country codes); these measurements therefore would include traffic from A to B.

Alternatively, separate meters could be used in country A to measure the traffic destined for each of the countries B and E; this might facilitate the accounting for each of these streams of traffic.

2.2 *Remuneration for transit routing by the exchange E*

The Administration * of country A remunerates the Administration * of country E for routing calls to B beyond the transit exchange in E on the basis of the number of traffic units from A to B passing through the international transit exchange in E. This number of traffic units might be measured by a special meter, reserved for calls to country B, which could be placed in country A on the circuits AE. The meter is activated only when the country code of country B is sent by the outgoing register of the exchange in country A.

The Administration * of country E is credited by the Administration of country A for the transit traffic sent via its international transit exchange to country B on behalf of country A and is entirely responsible for remunerating the Administrations * of countries D, F and B. This remuneration is included in the remuneration it makes for the entire traffic emanating from E and sent to country B, since the national traffic originating in E and the transit traffic originating in other countries is consolidated for accounting purposes.

In principle, the remuneration of the Administration * of country B by the Administration * of country E should comprise not only remuneration for use of the international circuit sections provided by the Administration * of country B and remuneration for use of facilities in the international transit exchange in country B, but also any remuneration for use of national extensions in country B.

If the remuneration for the circuits in section AE (which carry both terminal and transit traffic) is made on a flat-rate price basis which includes remuneration for the international

* or recognized private operating Agency (or Agencies).

exchange and the national extension, the transit traffic proportion of the amounts so included should be taken into account in calculating the remuneration to be paid by the Administration * of country A to the Administration * of country E for the traffic which is switched at E and routed to country B.

RECOMMENDATION E.251

MONTHLY TELEPHONE ACCOUNTS

1. The monthly telephone accounts are drawn up in accordance with a form of the type shown on the next page.

2. Monthly accounts relating to:

a) telephone traffic proper,

b) programme, television and phototelegraph transmissions,

are drawn up on separate forms, namely:

— Form No. 1 for telephone traffic proper,

— Form No. 2 for programme, television and phototelegraph transmissions.

3. Monthly accounts can be accepted by the Administrations * of the various countries concerned without formal notice of their acceptance being necessary. The Administrations * concerned obviously have the right to question an account, which should be done within two months from the date of receipt. Their observations in this connection should be sent to the Administration * which has sent the account, as soon as possible after receipt. Agreed adjustments are included in a subsequent monthly account.

Monthly accounts are sent by the Administration * responsible for their preparation direct to each of the other Administrations * concerned.

4. The limits given in No. 229 of the *Telephone Regulations* (Geneva revision, 1958) for discrepancies considered to be negligible in the adjustment of accounts will apply separately to accounts on Forms No. 1 ad 2.

5. Data relating to Form No. 1 can be subjected to sampling checks if the incoming Administration * considers it desirable.

These traffic samples will be taken as follows:

On a given day, the Administration * of the country of destination has observations made of a number of conversations chosen at random. For each of these is determined the route concerned, the time, the called subscriber's number, and on occasion the identity of the caller. (The first three factors can be obtained in semi-automatic service as well as in manual service.) Before noon on the following day, the Administration * of destination then asks the Administration * of origin to indicate the chargeable duration shown on the tickets for each of these calls.

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* or recognized private operating Agency (or Agencies).

An accounting check may also be made. In particular cases, where justified by the volume of traffic and by special agreement between Administrations *, an official of the Administration * receiving an account can visit the Administration * drawing up the accounts to see how the accounts are drawn up and to verify that the details of these calculations are as accurate as possible.

Specimen form for drawing up monthly international accounts

TELEPHONE ACCOUNT

Service: .....

Month: .....

Item	Number	Credit of: *B*		Credit of: *C*		Credit of: *D*	
		Quota	Total	Quota	Total	Quota	Total
Minutes full rate							
Zone I	4215 *	2.40	3372.—	1.40	1967.—	1.20	1686.—
Zone II	1422	2.40	1137.60	1.40	663.60	2.60	1232.40
Minutes reduced rate							
Zone I	810	1.44	388.80	0.84	226.80	0.72	199.40
Zone II	246	1.44	118.08	0.84	68.88	1.56	127.92
Report charges	40	0.40	16.—	0.25	10.—	0.20	8.—
Express charges	12	—	—	—	—	2.00	24.—
	—	—	5032.48	—	2936.28	—	3277.72

* The figures in the table are given as an example.

A = Country of origin; *B* and *C* = Transit country; *D* = Country of destination.

Explanatory notes

1. The currency utilized in this specimen is the gold franc.

2. The entry after " Service " should show the countries of origin and destination, the country of origin being shown first.

3. If the account does not relate strictly to a calendar month (e.g. because of the arrangements for reading meters in the automatic service), the period covered by the account should be shown.

4. The form should have a " Credit of " column for each country to be remunerated.

5. The entries in the " Item " column of the account for telephone traffic proper should be limited to " minutes " and to other items such as " Report charges ", " Express charges " for personal calls for which a messenger is sent, etc., which cannot be expressed in terms of minutes. A distinction should be made between " minutes " at full and reduced rates, between " minutes " in manual semi-automatic and automatic services, and between " minutes " corresponding to different charging zones in the country of destination.

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* or recognized private operating Agency (or Agencies).

6. The number to be entered in the " Number " column against the " minutes " entry in the " Item " column should include all the minutes to be taken into consideration for international accounting, including also supplementary charges equivalent to the charge for one minute for special facilities.

7. The quota to be shown in the " Credit of " column against the " minutes " entry in the " Item " column is the minute unit quota payable to the Administration concerned; the " Total " to be shown in the " Credit of " column should be obtained by multiplying the quota by the number of minutes.

8. The account for programme, television and phototelegraph transmissions should contain separate entries for each type of transmission and, in the case of programme transmissions, should, where appropriate, distinguish between transmissions a) over ordinary telephone circuits, b) over old type circuits, c) over normal type circuits, and d) the use of control circuits.

RECOMMENDATION E.252

DAILY COMPARISON OF THE NUMBER OF MINUTES OF CALL EXCHANGED BETWEEN INTERNATIONAL EXCHANGES

For the following reasons it is recommended not to make a daily comparison of minutes of call exchanged between international exchanges unless this should prove essential in a given relation:

1. A daily comparison of minutes of call exchanged burdens the service without any real profit.

2. The monthly accounts are established by the Administration of the country of origin in accordance with Article No. 40 of the *Telephone Regulations* (Geneva revision, 1958).

3. The operator responsible for charging in the international exchange determines the chargeable duration of calls after each call:

— in demand operating (manual or semi-automatic) there can be no agreement between the operators in the country of origin, of destination and the transit country on the chargeable duration of calls;

— in preparation operating there is an understanding between operators on the chargeable duration only as a result of a special agreement between the Administrations * concerned; even when there is an understanding between operators, the operator responsible for charging has the final word.

RECOMMENDATION E.253

REFUNDS

1. The C.C.I.T.T. feels it desirable that rebate practice on the telephone service should be brought into line with that obtaining in the telex service.

There are not very many refunds or rebates which cannot be deducted before telephone accounts are sent out. If their cost is borne by the Administration * which levied the charge, the formalities and correspondence otherwise required would be very considerably reduced.

* or private operating Agency (or Agencies).

2. The procedure whereby refunds and rebates not deducted from international accounts before these latter are sent off have to be borne by the Administration * which has levied the charge should apply to all telephone services: manual, semi-automatic, and automatic.

3. These provisions do not cover calls which are converted into collect calls after accounts have been despatched.

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* or private operating Agency.

Volume II-A

PART II

CHAPTER IV

Volume VI

PART III

CHAPTER I (cont'd)

CONTINENTAL TELEPHONE ACCOUNTING

RECOMMENDATION E.280

RECOMMENDATION Q.50

ACCOUNTING SYSTEM IN THE AUTOMATIC TELEPHONE SERVICE [1]

In the international automatic service, the charge will, in general, be automatically registered on subscribers' meters and Administrations * will no longer have tickets available for working out the distribution of charges on the basis of the chargeable duration of calls.

Although technically possible, the recording, for international accounts, of the chargeable duration of each effective call would require the installation of new equipment which does not seem justified with the sole object of establishing international accounts. The various systems used for charging subscribers would also result in different chargeable durations for the same traffic.

In these circumstances:

1. The C.C.I.T.T. recommends that accounts between Administrations * should be drawn up on the basis of the total of all call durations measured in the international exchanges in the country of origin on the appropriate meters. A charge in gold francs per minute of call duration, valid in both directions of the relation and applicable solely for international accounts relating to automatic service, will be fixed by agreement between Administrations *.

Exceptions to this general rule may occur in the following cases:

a) When the Administrations * concerned agree to dispense with accounts or to adopt lump-sum settlement,

b) When one or both of the Administrations * concerned already possess equipment capable of showing the chargeable durations incurred by the subscribers. The accounts prepared on these bases must give the same result as if the call durations had been measured.

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* or recognized private operating Agencies.

[1] This Recommendation applies to the European Continent. For the study period 1968-1972 of the C.C.I.T.T. it is the subject of a new study which might lead to an integration with the new system of international accounting described in Recommendation E.250.

c) When simplified code signalling systems are used which make it impossible to assess the call durations without excessive complications, the Administrations * shall measure the total holding time of the outgoing circuits. In that case, a correction factor shall be applied to the traffic figures so as to assess, in total call duration, the traffic which is to serve as the basis for preparing the accounts. The corrections to be applied must be determined by agreement between the Administrations * concerned.

2. International accounts for semi-automatic service shall continue to be based on the information recorded by the outgoing operators. Hence, in the international exchange of the country of origin, a distinction should be made, in the preparation of international accounts, between semi-automatic and automatic traffic.

In exceptional cases where, with simplified code signalling systems, this distinction is not possible, the Administration * of the country of origin should come to an agreement with the Administration * of the country of destination (and, where appropriate, with the Administrations * of transit countries) on the arrangements to be made.

3. To take account of the special system of charging for frontier relations (reduced charges between neighbouring frontier zones), special steps will have to be taken to discriminate between automatic calls in frontier relations and other automatic calls. This discrimination will be made every time that frontier traffic is routed wholly or partly (overflow) by international circuits having devices for measuring call duration.

This discrimination will, in general, necessitate:

a) a more complete analysis of the national (significant) number of the called subscriber than the one which is quoted in Recommendation E.161 (Q.11), and

b) the determination of the origin of the calls, since frontier charges depend on the distance between the outgoing and the incoming frontier zones.

4. Measurement of the call duration on meters shall be made according to country of destination. When the country of destination comprises several charging zones, these measurements will ordinarily be made according to the charging zone.

5. The measurement of call durations made by the international exchange in the country of origin to a given country of destination shall not distinguish between the routes involving different transit countries, provided that the traffic is transmitted over direct circuits which constitute the normal route. For accounting purposes, the total volume of traffic sent by each route is assumed to be proportional to the number of circuits in service on the 15th of each month on each route.

6. From the theoretical point of view, it might seem desirable for the Administration * of the country of origin to measure the traffic according to route and destination when a transit exchange in another country is used. However, it is left to Administrations * to decide whether:

— metering by route is much more complicated than metering by destination alone;

* or recognized private operating Agency (or Agencies).

— metering by route is justified for obtaining the traffic data necessary, as well as for the drawing-up of international accounts;

— the complication of metering by route can be justified by the prospect of setting up automatic transit traffic.

When the Administration * of the country of origin is not in a position to assess the traffic by route and by destination, it should come to an agreement with the other Administrations * concerned as to the way in which the traffic is assumed to be split up over the various routes.

7. The following special rule shall be permissible to avoid the need for an analysis of routes actually taken by a call beyond a transit exchange when several routes passing through different countries to the destination in question are possible from the transit exchange. The distribution of transit traffic over these different routes shall be taken to be the same as the distribution of traffic originating at the transit exchange for the destination concerned. The distribution between the routes shall be assessed every six months by the Administration * of the transit exchange and communicated to the Administration * of the country of origin.

8. In international accounts the traffic expressed in minutes relating to test calls, service calls and calls terminating at wrong numbers should not be deducted, since the over-all duration of these various types of call is very small in relation to the total traffic.

Nevertheless, when the percentage of wrong numbers due to faults in the equipment in the country of destination is greatly in excess of what is regarded as a reasonable percentage in a service of good quality, the Administration in the country of origin will be entitled to make certain deductions, in agreement with the Administration of the country of destination.

When free calls are allowed, for example during international telecommunication conferences, deductions may be made in the international accounts by the Administration * of the country on whose territory the conferences are held.

9. The arrangements concerning the acceptance of international accounts as defined in the *Telephone Regulations* (Chapter XIV—Accounting) are applicable to automatic traffic.

Accounts shall be drawn up monthly but, to avoid errors which might be serious in the event of the meters being faulty, the call duration meters shall be read every day.

10. It is not essential that call duration meters be read at midnight on the last day of the month: it will suffice if they are read on the last day of the month at the most convenient time. Should the last day of the month not be a working day, these meters can be read the day before or the day after.

The monthly account forwarded to the other Administrations * shall show the day on which meters were read. It ought to be possible to arrange for all meters in an exchange to be read on the same day, since there are relatively few circuits on which call duration meters have to be read.

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* or recognized private operating Agency (or Agencies).

11. The degree of accuracy of the call duration measurement equipment shall de ± 2% with a confidence limit of 95%, on the understanding that the result is obtained for a set of measurements covering an adequate number of calls, which, in light traffic relations, may lead to acceptance of the fact that ± 2% accuracy should be obtained on the overall measurements for the year, but not for each of the partial measurements made during that year (monthly measurements, for example, if the monthly interval is retained for the establishment of international accounts).

RECOMMENDATION E.281 [1]

CHARGES FOR CALLS CARRIED BY CONTINENTAL EMERGENCY ROUTES

1. The call charges for conversations exchanged over emergency routes are the same as for use of the primary route.

2. Calls exchanged over emergency routes always enter into the international accounts for their full chargeable duration.

3. When an emergency route is used, the total charge for the primary route (between first charging zones of the terminal countries) is divided equally between the various Administrations * concerned in the emergency route under consideration: that is to say that all these Administrations * receive an equal part, whatever the nature or the length of the circuits used. (When the network of destination is beyond the first charging zone, the Administration * of the country of origin should carry into the account for the Administration * of the country of destination a portion of the charge equal to the difference between that appropriate to the situation of the network of destination and the charge for the first zone). In order to permit the application of this procedure in the case of a call involving an international transit exchange, it is necessary for the operator at the transit exchange to indicate each time to the operator at the international exchange of the country of origin the emergency route used.

Examples:

Service *Netherlands - France.* — Emergency route: Amsterdam - Zürich (passing through Belgium and France) and Zürich - Paris.

Total charge for the primary route (between first zones): 2.60 gold francs.

Division when the emergency route is used: Netherlands, Belgium, Switzerland, France:

each $\frac{2.60}{4} = 0.65$ gold franc.

Service *Belgium - Great Britain.* — Emergency route: Bruxelles - Amsterdam - London.

Total charge for the primary route (between first zones): 3.00 gold francs.

Division when the emergency route is used: Belgium, Netherlands, Great Britain:

each $\frac{3.00}{3} = 1.00$ gold franc.

4. When it is necessary to use a land or submarine emergency route, because of the interruption of the primary land (or submarine) route providing an extension of an intercontinental circuit the total charge relative to the land (or submarine) route between the terminal of the intercontinental station and the terminal exchange is divided in conformity with the rules outlined above in paragraph 3.

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* or recognized private operating Agency (or Agencies).

[1] This Recommendation applies only to the European continent.

RECOMMENDATION E.282 [1]

MINIMUM REMUNERATION FOR A CONTINENTAL TRANSIT COUNTRY (EUROPEAN TYPE)

1. Terminal Administrations * should have a considerable measure of freedom to ask transit Administrations * to put circuits at their disposal. The transit Administrations * should be able to satisfy demands for direct circuits without being deterred by the fear that the traffic passed over these circuits would not provide them with sufficient revenue to meet the costs of setting up and maintaining the circuits. Accordingly:

1.1 It should be agreed that an Administration * which is asked to provide a circuit for transit traffic should have the right to ask in return for the guarantee of a minimum revenue.

1.2 This method should be used in preference to that of the guaranteed rental without, however, excluding it.

1.3 The Administrations * concerned should be left to fix this minimum by direct negotiations among themselves. A reduction should be made in the event of interruptions of the circuit in the transit country for any interruption lasting 24 consecutive hours.

2. The bases of calculation adopted in Recommendation E.230 for the establishment of costs for calls over carrier systems leave an adequate percentage reserve for telephone channels actually used.

3. There is thus no necessity for special remuneration of one or more transit countries when, during the period of progressive utilization of the circuits of a direct 12-channel group, some of the 12 channels in the group are not yet being used.

* or recognized private operating Agency (or Agencies).

[1] This Recommendation, which will be studied under Question 4/II in the 1968-1972 C.C.I.T.T. study period, applies to the European continent.

PART III

SPECIAL SERVICES UTILIZING THE INTERNATIONAL TELEPHONE NETWORK

(Operating, charging and accounting)

CHAPTER I

GENERAL

RECOMMENDATION E.300

SPECIAL USES OF CIRCUITS NORMALLY EMPLOYED FOR AUTOMATIC TELEPHONE TRAFFIC

The C.C.I.T.T. considers

a) that special services exist which occasionally require the provision of telephone circuits for uses such as:

— reserve circuits for v.f. telegraphy,
— circuits for phototelegraph transmissions,
— control circuits for programme transmissions,
— leased circuits (other than permanent full-time leases);

b) that the international telephone service is becoming more and more automatic, and that only a few manual circuits will be kept to form a reserve network;

c) that it is therefore necessary to provide automatic circuits for special uses other than telephony;

d) that telephone circuits assigned for special uses must, when needed, be made available to the special services as rapidly as possible;

e) that it must be guaranteed that, after the circuits have been used for a special purpose, they will be returned to the telephone service without delay;

f) that the switching of circuits for special purposes should not disturb the operation of telephone service.

The following provisions are therefore to be observed:

1. In an international telephone relation, the number of automatic circuits assigned for special purposes should be in reasonable proportion to the total number of circuits, so that their occupation will not hamper the flow of automatic telephone traffic.

2. Circuits to be used for special purposes should be passed at the outgoing and incoming ends through transfer panels on which the wanted circuit is disconnected manually from the telephone equipment and connected to the terminal of the special service concerned.

Alternatively, circuits assigned for special uses should be fitted, in the telephone equipment, with a device for automatic switching to the transfer panel of the special service, the operation being commanded by the latter. (This method is preferable because with the first method a telephone call could be interrupted if proper care is not exercised.)

3. The switching operations should take place under the control of the outgoing International Maintenance Centre (I.M.C.). The I.M.C. may delay or limit the provision of telephone circuits for other purposes, particularly when restrictions are imposed on the telephone traffic.

4. The following arrangements should be followed when special connections are set up and cleared:

4.1 The occupation of a telephone circuit for a special purpose should be marked on the transfer panel at the outgoing end; conversely, if such a circuit is in fact engaged, it must be marked busy in the telephone switching equipment.

4.2 A circuit assigned to a special use may not be taken for the service in question if a telephone call is in progress. However, arrangements should be made to ensure that the circuit cannot be engaged by another telephone call when the call is over (*preliminary booking*).

4.3 The circuits in a group of telephone circuits that are reserved for special uses should be last-choice circuits, to reduce the risk of finding them busy when required.

4.4 When the circuit is free, the supervisor in charge of the transfer panel at the outgoing end takes the necessary steps to withdraw the circuit from the telephone service. The responsible supervisor at the incoming end is then asked to make the necessary operations if the telephone equipment is not disconnectable by remote control.

4.5 While awaiting notification from the incoming end of completion of transfer to the special service, the outgoing supervisor tests the connection before making it available for its new functions.

4.6 The same procedure is followed at the outgoing end when the circuit is restored to the telephone service. To prevent a subsequent telephone call from being ineffective, care must be taken to clear the special call at the incoming end first.

5. Bookings of leased circuits or order lines for programme transmissions are arranged in advance and are not urgent. The delays required by the connection of two circuits in tandem when a connection is operated entirely in automatic transit give rise to no particular difficulties.

6. Where telegraph systems are concerned, the primary requirement is rapid replacement of the faulty v. f. bearer circuit. In view of the delay which would occur in employing two separate links to form a reserve circuit, it appears that in relations in which automatic transit switching is the normal method of operation, a direct circuit should be retained.

Such a direct circuit could be manual or automatic. An automatic circuit would normally be used to carry the telephone traffic. It should be noted that this will then be used as a first-choice route and will thus carry the heaviest load. The risk of finding it busy, when needed, will therefore be at its maximum.

In such circumstances, preliminary blocking of the wanted circuit should be effected (see under 4 b)). So long as the equipment is unable to perform this operation it will be preferable to keep one manual direct circuit.

7. The delay in establishing phototelegraph calls via a transit centre (transit IPP) is not so critical. In this case, application of Recommendation E.320 will speed up the placing of two circuits end to end at the transit centre to establish the connection, and it will not be necessary to keep direct circuits in relations where automatic switching is the method normally used for telephone calls in transit.

8. The same circuit should not be assigned to more than one special service, so that the various transfer panels for such services may be placed separate from one another should the terminal country so wish.

CHAPTER II

PHOTOTELEGRAPHY

RECOMMENDATION E.320

SPEEDING UP THE ESTABLISHMENT AND CLEARING OF PHOTOTELEGRAPH CALLS

When international phototelegraph calls are sent over telephone circuits, the total time of occupation of the circuit often greatly exceeds the duration of the phototelegraph call itself.

It is also important that telephone circuits should be held for as short a time as possible.

The C.C.I.T.T. therefore recommends to Administrations * to bear the following directives in mind whenever it is technically practicable:

1. Telephone circuits intended for phototelegraph transmissions should, at terminal repeater stations, pass through panels at the International Phototelegraph Position (IPP) enabling these circuits to be disconnected from the telephone service equipment and interconnected or connected to phototelegraph stations. Before switching on this circuit, it must be ensured that no telephone calls are in progress[1]. If there are calls, the circuit must be blocked as soon as the telephone call is over (preliminary blocking).

2. The calling phototelegraph position must be ready to call the corresponding phototelegraph position over the telephone circuit as soon as it notes that the chosen circuit has been cleared. The calling signal should automatically disconnect the telephone equipment from the circuit at the called end. The circuit is thus immediately available for the establishment of a phototelegraph call.

3. If the called phototelegraph position has to be obtained through a transit phototelegraph position, the procedure outlined above is applied successively to the two circuits which are to be interconnected.

4. The same signal (see paragraph 2) can also be used to invite the incoming, and possibly the transit, IPP to enter the line:

— if there are difficulties, or

— to signal the end of transmission.

Note. — The calling frequency f_2 used for phototelegraphy should be different from that used for telephone signalling f_1. In the case of automatic or semi-automatic telephone circuits, frequency 500/20 Hz will be adopted as the signalling f_2 frequency for phototelegraphy.

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* or recognized private operating Agency (or Agencies).

[1] At the time agreed upon with the telephone service, if such a previous agreement is considered to be necessary by the telephone operating services.

RECOMMENDATION E.321

RATES FOR PHOTOTELEGRAMS AND PRIVATE PHOTOTELEGRAPH CALLS

(See Recommendation F.83 in Volume II-B, Section 6)

RECOMMENDATION E.322

PROVISIONS RELATING TO PRIVATE PHOTOTELEGRAPH CALLS

(See Recommendation F.80 *bis* in Volume II-B, Section 6)

RECOMMENDATION E.323

RULES FOR PHOTOTELEGRAPH COMMUNICATIONS SET UP OVER CIRCUITS NORMALLY USED FOR TELEPHONE TRAFFIC

(See Recommendation F.82 in Volume II-B, Section 6)

CHAPTER III

SOUND PROGRAMME TRANSMISSIONS

RECOMMENDATION E.330

CONTINENTAL SOUND PROGRAMME TRANSMISSIONS (EUROPEAN TYPE)

SECTION I. — CONDITIONS OF ACCEPTANCE

1. Requests for the use of circuits for continental sound programme transmissions should continue to necessitate the intervention of the Administrations * or of the *controlling services* to which the Administrations * have delegated their authority in this matter,

Therefore, continental sound programme transmissions should be accepted under the following conditions:

1.1 Requests for the use of circuits for sound programme transmissions should be addressed by the Broadcasting Organization (or organizations) which controls the broadcast receiving station (or stations) to the " controlling service " of its country (or their countries).

Information concerning the names, exact postal address, telegraphic addresses and also telephone numbers of the controlling services to which Broadcasting Organizations in the various countries should apply for circuits appear in the Routine Maintenance Programme (see Recommendation M.15) published by the C.C.I.T.T. Secretariat, Administrations * undertaking to pass this information to the Broadcasting Organizations of their respective countries.

Requests for the use of circuits for sound programme transmissions should always be made at the earliest possible moment and in any event not later than *twenty-four hours before the transmission* is to begin, so that Administrations * may make the requisite arrangements. These requests should be complied with if no inconvenience to the general telephone service is likely to result and if technical considerations permit. If a request has not been made with *at least twenty-four hours' notice*, the Broadcasting Organization may not claim a reduction in charges for an interruption or any other incident arising on the broadcast transmission circuit during the preparatory period, or during actual transmission, when it has been impossible to adjust and test the circuit with the necessary care owing to insufficient time being available.

1.2 For each continental broadcast relay affecting only receiving radio stations situated in one country, the Broadcasting Organization which controls the receiving radio station or stations, after premiminary agreement with the Broadcasting Organization controlling the transmitting microphone, should make a request to the controlling service of its country for the use of the necessary circuits, accompanied by an undertaking to pay the whole charge in respect of the use of these circuits.

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* or recognized private operating Agencies.

1.3 For each continental broadcast relay affecting broadcast receiving stations situated in several countries, the procedure is as follows:

The list of broadcasting stations which are to receive the transmission (showing the telephone exchange to which the transmitting microphone is connected) is sent to each of the Broadcasting Organizations concerned, by the Broadcasting Organization controlling the transmitting microphone; each Broadcasting Organization should send this list to the controlling service of its own country, after having brought in the additions or modifications which it considers necessary. This list should include the designation of all control circuits required and, where necessary, of all the reserve circuits requested.

Unless otherwise agreed upon, the controlling service of the country in which the programme originates shall be taken as the overall controlling service for the transmission concerned.

The overall controlling service should inform each of the controlling services concerned, at the earliest possible moment, of the circuits to be used and the special repeater station or stations with which the Broadcasting Organizations may communicate if any unforeseen incident, which must be rectified urgently, arises in the course of the programme transmission.

As soon as it has received the necessary information concerning the circuits for the use of which it will have to pay, each Broadcasting Organization controlling one or more broadcast receiving stations should forward *without delay* to the controlling service of its country a request for the use of these circuits with an undertaking to pay the whole charge in respect of their use.

To facilitate this procedure it is desirable that the Broadcasting Organizations should study in advance the cases of multiple relays which are likely to occur frequently (see the following Annex).

SECTION II. — CONTROL CIRCUITS

The following directives should be observed for the constitution of control circuits in connection with the use of sound programme circuits:

2.1 *Definitions*

2.1.1 *A control circuit* (circuit de conversation) is a telephone circuit which provides a direct connection between the place where a transmitting microphone is installed and the point where the broadcast programme is used (recording apparatus or radio broadcasting station). This connection is used to supervise the transmission of the programme broadcast and it enables any necessary remedial measures to be taken quickly in case any difficulties or interruptions occur during the transmission; it also permits the programme transmission circuit to be released at the right moment and it provides, therefore, the appropriate means by which the chargeable duration of the sound programme transmission can be precisely determined.

2.1.2 For the setting-up of control circuits, the following distinctions should be drawn between " regular " and " occasional " sound programme transmissions:

a) *Regular transmissions* are those which are ordered once and for all because they take place at regular intervals, at the same times, over the same routes, and always between the same points.

b) *Occasional transmissions* are all transmissions which do not fall within the above definition.

2.2 *Constitution of control circuits*

It is desirable to distinguish between the following cases;

— simple sound programme transmissions;

— multiple sound programme transmissions.

2.2.1 *Simple programme transmissions.* — in the case of regular transmissions, especially if the sound programme transmitted is of such a nature that the Broadcasting Organization is ready to tolerate any incident which might occur because of the absence of a control circuit during the transmission of the sound programme, the use of a control circuit should be obligatory only during the " preparatory period ".[1]

For certain regular transmissions effected over a long period, the use of a control circuit might even be dispensed with during the preparatory period if the Broadcasting Organizations so request.

In the case of an occasional transmission, the use of a control circuit should in principle be obligatory during the preparatory period and should be earnestly recommended throughout the programme transmission; indeed, the Broadcasting Organizations are interested in reducing as much as possible the duration of any incidents which occur during the transmission of the broadcast programme and, on their part, the Administrations * should see that too high a power is not employed in the course of the transmission, such as might cause interference on telephone circuits on the same route.

2.2.2 *Multiple sound programme transmissions (or multiple relays)*

2.2.2.1 Multiple programme transmissions in which the sound is picked up at one point only:

a) if the first distribution point of the sound programme transmission circuits serves a broadcast transmitting station in the same town and participating in the multiple transmission, it is strongly recommended that control circuits should be envisaged, at least:

— between the studio where the transmitting microphone is installed and the distrition point of the sound programme transmission circuits;

— between the first distribution point and the various broadcast transmitting stations;

b) when the above conditions do not apply, it is recommended that, as far as possible, control circuits should be envisaged between the studio where the microphone is installed, on the one hand, and the various broadcast transmitting stations on the other hand.

In the two cases indicated above, control circuits should always be provided during the preparatory period and their use should be recommended throughout the transmission of the sound programme.

2.2.2.2 Multiple sound programme transmission with several sound pick-up points:

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* or recognized private operating Agencies.

[1] The preparatory period is defined under 3.1.2.

A preliminary study should be carried out between the Broadcasting Organizations and the Administrations * concerned in order to determine what control circuits should be insisted upon during the preparatory period [1] and which control circuits should be recommended for use during the transmission of the sound programme.

Experience has shown that in the case of two-way multiple broadcast transmissions with several sound pick-up points, it is desirable to have control circuits between the studio directing the transmission and the various sound pick-up points in order that the sound programme concerned should proceed satisfactorily.

2.2.3. *General remark.* — The Broadcasting Organizations should be informed that when they decide to dispense with the use of a control circuit during the transmission of a sound programme, they are not entitled to claim a reduction of the charge on account of some incident occurring during the course of the transmission, even if the incident is due to a breakdown in the sound programme circuit which could not be remedied quickly because of the absence of a " control circuit ".

SECTION III. — CHARGING

It is noted that, although ordinary telephone circuits might be used, if need be, for sound programme transmissions, it is necessary, in order to be able to transmit music, and even speech, perfectly, to arrange for the use of circuits in which crosstalk is reduced to the lowest possible level and which effectively transmit a frequency bandwidth wider than with ordinary telephone circuits;

that the types of circuits can be distinguished as indicated in the following table:

Type of circuit	Audio frequency bandwidth effectively transmitted
Ordinary telephone circuit	300 to 3400 Hz
Old-type sound programme circuit	50 to 6400 Hz
Normal-type sound programme circuit	50 to 10 000 Hz

that the costs of " sound programme circuits " are much higher than those for ordinary telephone circuits;

that the costs of supervision and maintenance of sound programme circuits are much higher than those of ordinary telephone circuits;

It is therefore *recommended* that, when " sound programme circuits " are available, they should be used in all cases for sound programme transmissions instead of ordinary telephone circuits;

that it is appropriate to make higher charges for the use of such circuits for sound programme transmissions than are made for the use of ordinary telephone circuits;

that Administrations * should take the following directives as guidance when charging for programme transmissions.

* or recognized private operating Agencies.

[1] The preparatory period is defined under 3.1.2.

3.1 *Preliminary*

3.1.1 A sound programme circuit is a uni-directional transmission channel. If a sound programme transmission takes place simultaneously in both directions, thus requiring the use of two special circuits, it should count as two distinct sound programme transmissions.

3.1.2 For each continental sound programme transmission a distinction is made between:

a) the *line-up period*, in which Administrations * proceed to line up the continental sound programme line before handing it over to the Broadcasting Organizations;

b) the *preparatory period*, in which these Broadcasting Organizations effect their own line-ups, tests and various manœuvres before carrying out the actual sound programme transmission;

c) the actual sound programme transmission.

The chargeable duration begins at the moment when the sound programme circuit transmission is handed over to the Broadcasting Organization, i.e. at the start of the preparatory period.

3.1.3 For charging purposes, no distinction is made between periods of light and heavy traffic in the use of " sound programme circuits ".

3.1.4 The use of " control circuits " in sound programme transmissions is liable to the same charge as the use of an ordinary telephone circuit, i.e. there is no surcharge, and periods of light and heavy traffic may be taken into account.[1]

3.1.5 A *surcharge* is applied in respect of each sound programme transmission [2] without regard to the type of circuit used, to cover the expenses incurred in:

— the technical preparation of continental circuits by way of special equipment or lining-up,

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* or recognized private operating Agency (or Agencies).

[1] In order to avoid variations in interpretation, which may have occurred in the past, the " charge for station calls " should provisionally be understood to be as follows (pending further examination of the matter):

a) For the part of the sound programme transmission in the period of heavy traffic, the charge to be collected is that appropriate to station calls during the period of heavy traffic;

b) for the part of the sound programme transmission in the period of light traffic:
   — one half ($\frac{1}{2}$) of the charge appropriate to station calls during the period of heavy traffic, for a transmission the duration of which (during the period of light traffic) is at least one hour;
   — three-fifths ($\frac{3}{5}$) of the charge appropriate to station calls during the period of heavy traffic, in other cases.

Legal time in the country receiving the sound programme transmission will be used in order to determine the period of heavy traffic or the period of light traffic.

[2] Unless otherwise agreed among Administrations or recognized private operating Agencies, the above surcharge shall apply to intercontinental as well as to continental calls.

If, in any particular relation, a single Administration (or Agency) applies the C.C.I.T.T. recommendation and is alone in levying the eight-minute surcharge in the event of tardy cancellation of a transmission, the surcharge would not be shared and would not appear in the international accounts.

— the exchange of telegraph and telephone messages for the preparation of a sound programme transmission,

— the setting-up and testing of the chain of circuits to be used for the transmission.

This surcharge is shared between the Administrations * concerned on the same basis as the charge for the programme transmission itself. The surcharge is equal to the charge for *8 minutes of sound programme transmission* over the same circuit between the terminal points concerned. The surcharge is not payable if the sound programme transmission does not take place due to circumstances under the control of the telephone service.

It is to be understood that the surcharge covers the charges which would otherwise be made for the telegrams and telephone calls exchanged in the preparation of the sound programme transmission. The surcharge does not apply to the so-called " control " circuits.

The *eight-minute* surcharge shall be levied if, for reasons over which Administrations * have no control, the Broadcasting Organization which has ordered the circuit informs the Centralizing Office to which it had originally applied that a sound programme transmission is to be cancelled, less than six hours before that transmission was due to begin.[1]

3.1.6 When the transmitting microphone is not connected directly to the network of sound programme circuits, and a special junction circuit has to be provided between the location of the transmitting microphone and the point of junction with the network of sound programme circuits, the Administration * responsible for the broadcast transmitting station should forward to the Administration * responsible for the broadcast receiving station particulars of the special expenses incurred in the setting-up, alignment and recovery at the end of the transmission of the junction circuit in question. These expenses are debited by the latter Administration * to the Broadcasting Organization controlling the broadcast receiving station.

3.2 *Charges in normal cases (use of " continental sound programme circuits ")*

In fixing the following charges for continental sound programme transmissions in the *normal case* in which programme transmissions are effected by means of " *programme circuits* ", account has been taken of the cost elements established by the C.C.I.F., as the result of several studies, the last as recently as 1955. These cost elements are given in the following table.

Reserve circuits are not normally necessary, but if the Broadcasting Organizations deem it necessary to have at their disposal such circuits for a given continental broadcast relay, the same charge should be applied as would have been done had they actually been used for the relay in question and for its full duration.

* or recognized private operating Agency (or Agencies).

[1] See footnote 2 under item 3.1.5.

Bases for the calculation of charges applicable to sound programme circuits

		Old-type circuit (effective bandwidth transmitted; at least 50 to 6400 Hz)[1]	Normal-type circuit (effective bandwidth transmitted: at least 50 to 10 000 Hz)
Charges for 3 minutes of sound programme transmission	per 100 km (crow-flight) of circuit [2,3]	0.75 gold fr.	0.75 gold fr.
	for each international exchange (at the extremities of the connection) [4]	0.75 gold fr.	2.40 gold fr.
Fixed surcharge, independent of the duration of the sound programme transmission		Equal to the charge for 8 minutes of *sound programme transmission*, in the *relation* in question and by the *circuit* in question.	
If, for their own purposes, Administrations * wish to apply charges lower than those based on the above standards, this may be done by special agreement.			

[1] If a sound programme circuit includes even one section only of old-type circuit, the transmission in question is charged for at the tariff applicable to old-type circuits; but it is recommended that an international connection for a sound programme transmission should not be set up with one single section of old-type circuit in an otherwise complete chain of normal-type circuits, since the Administration * which furnishes the section of old-type circuit occasions a considerable loss to the other Administrations * participating in the international connection.

[2] The part of the charge relating to the line is calculated, by each country taking part in the continental sound programme transmission, on the basis of crowflight distance:

— for the terminal countries, between the extremity of the circuit and the point of entry into (or exit from) national territory,

— for a transit country, between the points of entry into, and exit from, national territory.

[3] In applying the above tariff, any residual distance of less than 50 km may be rounded up to a maximum of 50 km and any residual between 50 km and 100 km may be rounded up to a maximum of 100 km. Moreover, Administrations * should examine the possibility of having the smallest possible number of charging zones for each country, so as to obviate difficulties and anomalies in fixing charges applicable to continental sound programme transmissions.

[4] The part of the charge relating to the international exchange does not take into account any trunk circuits which may be provided between:

— the international exchange, on the one hand, and

— the transmitting microphone at the receiving broadcasting station, on the other.

3.3 *Charge applicable when an ordinary continental telephone circuit is used for a sound programme transmission*

In the exceptional case in which a sound programme transmission takes place over ordinary continental telephone circuits, the "charges for station-to-station calls" will apply, together with a surcharge corresponding to 8 minutes of telephone conversation in the charging period (period of heavy or light traffic) in which the programme transmission begins [1].

* or recognized private operating Agencies.

[1] See footnote 1 under item 3.1.4.

3.4 *Charge to be applied when the circuit for a sound programme transmission is of mixed make-up*

When a sound programme transmission takes place over a circuit made up partly of an " international sound programme circuit " and partly of an " ordinary telephone circuit " the whole circuit is charged for on the basis of the *charges for station calls in the period of heavy traffic* and the surcharge is equal to the charge applicable to 8 minutes of conversation during the period of heavy telephone traffic.

3.5 *Charge to be applied in the case of multiple broadcast transmissions*

If the transmission is intercepted, at intermediate centres, by other broadcasting stations, the sound programme transmission is, from the point of view of the charge, considered as several distinct calls; the one between the origin and the first intermediate broadcasting station; the others between the constitutive broadcasting stations or between a distribution point and an intermediate broadcasting station, or between the last intermediate broadcasting station (or the last distribution point) and the terminal broadcasting station.

3.6 *Charges in the case of sound programme transmissions over circuits with special itineraries*

3.6.1 Where a Broadcasting Organization considers the quality of transmission to be unsatisfactory on a direct sound programme circuit and requests the use of an indirect circuit made up of sound programme circuits passing through countries other than those through which the direct sound programme transmission circuit passes, the charge applicable is based on the sum of the sound programme transmission charges in respect of each of the circuits interconnected.

3.6.2 If two Broadcasting Organizations have not been able to modify their sound programme schedules by mutual agreement, and if both ask for the use of a direct sound programme circuit at the same time, the second organization to make its application will use a specially composed indirect link formed by interconnection of sound programme circuits and will pay a charge based on the sum of the sound programme transmission charges payable for each of the interconnected circuits.

3.6.3 If a complete breakdown or a serious interruption occurs on a direct sound programme transmission circuit at the time arranged for the transmission, and if an indirect circuit passing through countries other than those through which the direct circuit passes has been set up for handling this transmission, the Broadcasting Organization shall nevertheless pay the same total charge as if the direct circuit had been used; this total charge is divided among all the countries traversed by the indirect circuit in the manner indicated in Recommendation E.281.

3.6.4 Where the Broadcasting Organizations request control circuits following the same route as the indirect sound programme transmission circuits mentioned above, the charge applied for the use of these control circuits is calculated on the same basis as the charge for indirect sound programme transmission circuits.

SPECIMEN OF DAILY REPORT

Continental Sound Programme Transmissions completed on .....

London Exchange

Subject of the sound programme transmission	Circuits or sections of circuits used for the transmission		Type of circuits used		Time at which circuit was		Duration not counted (faults, interruptions, etc.)	Number of chargeable minutes	Unit charge	Amount of charge	Name of Broadcasting Organization which should pay the charge or the telephone Administration *** which should collect it
	from	to **			put at disposal of Broadcasting Organization	released by Broadcasting Organization					
Concert from London broadcast by Bruxelles, Berlin, København (see following diagram) *	London	Bruxelles									

* In the case of a multiple relay using a number of circuits simultaneously, it would be advantageous to attach to the daily sheet a diagram of the multiple relay.
** The receiving broadcast stations are underlined.
*** or recognized private operating Agency.

3.7 *Determination of the chargeable duration: beginning and end of a transmission*

3.7.1 Personnel responsible for the supervision of and charging for continental sound programme transmissions in the European system should act in accordance with the " Instructions for personnel responsible for the supervision of and charging for sound programme transmission in the European system ".

3.7.2 The supervision of a continental sound programme transmission is generally effected by the terminal repeater stations of the sound programme circuit concerned.

It is possible that the equipment at the international telephone exchanges will permit the operating personnel, already responsible for fixing the chargeable duration of telephone calls, to be entrusted with the task of determining the chargeable duration of a sound programme transmission and in that case this chargeable duration should be fixed with the same precision as for a telephone call.

Where the equipment of the telephone exchanges in question does not permit this procedure, the technical officers of the terminal repeater stations should come to an arrangement between themselves for fixing accurately at the end of the sound programme transmission:

a) the time at which the circuit was placed at the disposal of the Broadcasting Organization (beginning of the chargeable duration);
b) the time at which the circuit was released by the Broadcasting Organization (end of chargeable duration);
c) when necessary, the time and duration of any interruption or incident which may have occurred (in order to determine the rebate).

3.7.3 The time at the beginning and end of the chargeable duration, as well as the time of occurrence and duration of any breakdowns which may occur, are entered on a daily report conforming to the specimen reproduced opposite. This daily report is sent on the same day to the office responsible for co-ordinating all the details necessary for the establishment of the international accounts. In addition, the details relative to interruptions are noted on the report sent periodically to the technical services concerned.

When the officials at the two terminals of a circuit have agreed on the chargeable duration of a sound programme transmission, the official at the terminal station nearest the Broadcasting Organization which has to pay for the use of the circuit concerned should notify that organization of the number of chargeable minutes.

3.8 *Rebates in the case of faulty transmissions*

If a fault or interruption, even of short duration, occurs during the course of a sound programme transmission, it is necessary to consider whether this fault or interruption has, depending upon the nature of the sound programme relayed (play, talk, high-quality music, etc.), rendered the remainder of the broadcast difficult for the listeners to understand or has reduced considerably the pleasure given to the people listening to high-quality music. It is necessary therefore to make a special examination each time in order to determine the corresponding rebate, which should take account of the trouble actually caused (by any incidents which may occur) to the Broadcasting Organization which receives the transmissions. It is for the Administration * of the country in which the controlling station is

* or recognized private operating Agency (or Agencies).

situated (this is generally the terminal station nearest the Broadcasting Organization which receives the transmission) to assess the reduction to be made, and the opinion of this Administration * should prevail over the opinion of the other Administration * involved in the continental sound programme transmission. It goes without saying that such a reduction should be applied only if the interruption or incident has been caused through service deficiencies or a case of *force majeure* (see, in particular, the remarks made above under 1.1 and 2.2.3).

3.9 *Levying of charges*

The charges and surcharge for the use of a circuit are levied on the Broadcasting Organization (State or private) which undertook to pay for the use of the circuit in question; they are due for the full period during which the circuit has been put at the disposal of that Broadcasting Organization, before the transmission proper.

The charges and surcharge for the use of a circuit are always indivisible and should be paid in their entirety by one Broadcasting Organization.

3.10 *Sharing of the total charge between Administrations* *

3.10.1 When a continental sound programme connection is constituted entirely of circuits of one type (old type or normal type) the share due to each Administration * furnishing a circuit is equal to the charge fixed for the use of that circuit.

3.10.2 Provisionally, a section of " normal-type circuit " incorporated in a chain of mixed circuits is treated as an " old-type circuit ". When such a mixed chain is used, the total charge is divided as though all the circuits in question were of old type.

3.10.3 When a continental connection includes sound programme transmission circuits and ordinary telephone circuits, " hypothetical charges " are calculated on the following basis, to determine the sharing of the total charge for the sound programme transmission, failing agreement to the contrary between the Administrations * concerned:

— on the basis of the charge for station calls (during the charging period in question) for the Administrations * of the countries which provide a section including one, or more, ordinary telephone circuits;

— on the basis of the charge for old-type sound programme circuits for Administrations * of the countries which provide sound programme circuits (old type or normal type) throughout the entire section within their territories.

The total charge is divided in proportion to these hypothetical charges.

3.11 *Accounting*

3.11.1 The office responsible for co-ordinating all the details necessary for accounting for continental sound programme transmissions should:

a) assemble all the information in respect of the sound programme transmissions supplied either by the co-ordination service of its own country, or by the repeater stations (daily reports) and check this information by comparing the various particulars;

* or recognized private operating Agency (or Agencies)

b) undertake the collection of the charge from the Broadcasting Organization of its own country;

c) enter the sound programme transmission in the monthly statement which will permit the subsequent sharing of the charge;

d) send these statements every month to the accounting service responsible for actually dividing the charge between the Administrations * of the different countries concerned.

3.11.2 The monthly telephone accounts exchanged between the Administrations * include a special column for sound programme transmissions and in this special column distinction is made between programme transmissions:

a) over ordinary telephone circuits,

b) over sound programme circuits (old type),

c) over sound programme circuits (normal type).

The use of control should also be indicated.

SECTION IV. — LEASE TO BROADCASTING ORGANIZATIONS OF CIRCUITS FOR CONTINENTAL SOUND PROGRAMME TRANSMISSIONS

The conditions of lease of circuits for sound programme transmissions ought to be identical with those already fixed for the lease of ordinary telephone circuits. This will also avoid any difficulty when the lease of a sound programme circuit is accompanied by the lease of a corresponding control circuit.

Administrations * should therefore be guided by the following principles when leasing continental sound programme circuits.

4.1 *Conditions of acceptance*

4.1.1 A continental sound programme circuit will be leased only if spare ones exist in the relation in question.

4.1.2 Under no circumstances may the circuit be made available to third parties.

4.1.3 In principle, a lease should be for an initial period of one month; nevertheless, leases for periods shorter than one month may be arranged by agreement between the Administrations * concerned. Leases continue, after the initial period, month by month, until terminated by one party or the other by at least two weeks notice expiring at the end of a monthly period of lease.

4.1.4 Administrations * reserve in full the right to take back for their own use a leased continental sound programme circuit, if the exigencies of the general service so demand.

4.1.5 Rental is payable monthly in advance.

4.1.6 If an interruption occurs for which the telephone service is responsible, the originating Administration * makes a rebate if requested to do so by the lessee. The rebate is determined on the basis indicated in part 4.2 (Charging) below.

* or recognized private operating Agencies.

4.2 *Charging*

4.2.1 The charge for the lease of a continental sound programme circuit should correspond to that for 6000 minutes of use of the programme circuit in question per month.

4.2.2 The charge for leases for periods of 10 days or less should be that corresponding to 240 minutes of use for each day of lease of the sound programme circuit in question, together with a surcharge corresponding to 30 minutes of use of the sound programme circuit in question, no matter what the actual period of lease is.

4.2.3 The charge for leases exceeding 10 days but not exceeding 25 days should be that corresponding to 240 minutes of use of the sound programme circuit in question, per day of lease, without surcharge (thus for 11 days lease the charge is equal to that for $240 \times 11 = 2640$ minutes).

4.2.4 If a lease is extended beyond the 25th day so as to last one month, the charge should be that for 6000 minutes of use of the sound programme circuit in question.

4.2.5 If a lease is for a period exceeding one month, the charge for the first month should be that indicated above, and the charge for each additional day should be that corresponding to 200 minutes of use of the sound programme circuit in question.

4.2.6 If an interruption occurs for which the telephone service is responsible, a rebate should be granted only if the continental sound programme circuit has been completely interrupted for a continuous period of 3 hours or more. The maximum rebate allowable should not exceed one or other of the two following limits:

— 40 minutes' use of the circuit for each continuous 3-hour period of interruption duration,

— 200 minutes' use of the circuit per day for a continuous interruption of 24 hours in the case of leases of over 25 days (240 minutes' use of the circuit per day for a continuous 24-hour interruption in the case of leases of 25 days or less).

4.2.7 Several methods may be used in collecting and accounting for the total amounts due in respect of a lease. In particular one of the following methods might be used:

a) The Administration * of the country in which the ordering Broadcasting Organization is situated collects the full rental and makes the appropriate entries in the international accounts.

b) The Administration * of one of the terminal countries collects from the Broadcasting Organization in its country, in national currency, the share of the rental for the circuit on its territory; the Administration * of the other country collects the balance of rental due and, when appropriate, makes any necessary payments to Administrations * of transit countries.

* or recognized private operating Agency.

ANNEX

(to Recommendation E.330)

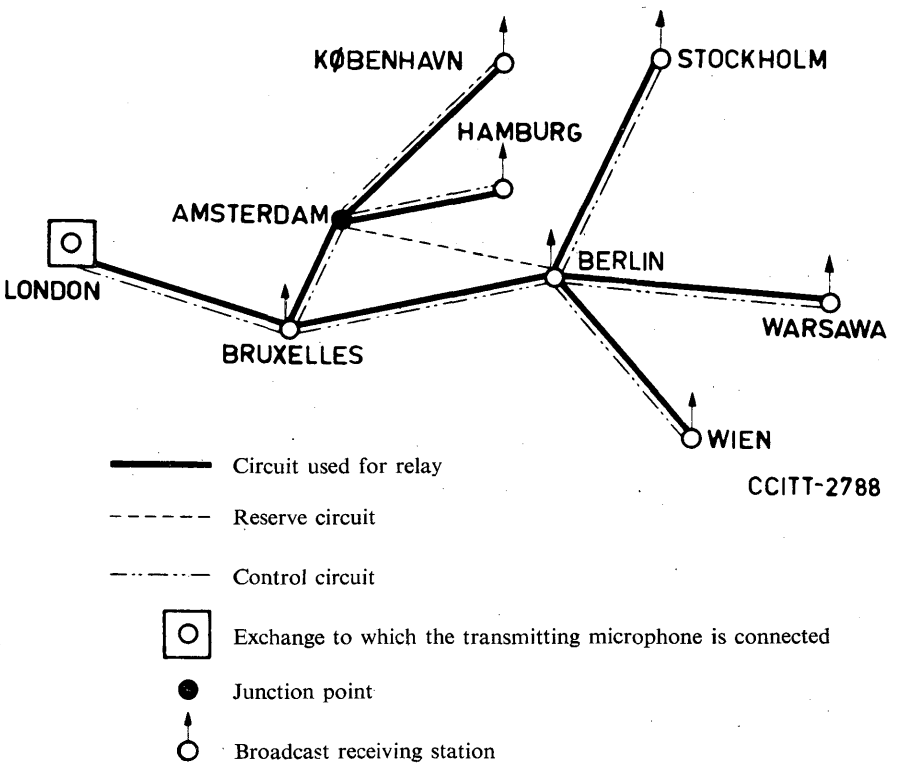
Example of a multiple relay of a sound programme transmission

In the following diagram, it is assumed that the Broadcasting Organization in Bruxelles which broadcasts the transmission coming from London, pays the charge for the Bruxelles-London circuit; that the Broadcasting Organization in Berlin pays the charge for the Berlin-Bruxelles circuit, while the Broadcasting Organizations in Stockholm, Warszawa and Wien pay for the Berlin-Stockholm, Berlin-Warszawa and Berlin-Wien circuits respectively.

As Amsterdam is not broadcasting the transmission, the Broadcasting Organizations in Hamburg and København should arrange in advance which organization will pay the charge for the Bruxelles-Amsterdam circuit.

If, for example, the Broadcasting Organization in Hamburg agrees to pay the charge for the Bruxelles-Amsterdam section, because Amsterdam is not broadcasting the transmission, the charges to be collected in Hamburg and in København respectively should be based on a transmission from Bruxelles to Hamburg and a separate transmission from Amsterdam to København.

Similarly, prior agreement between the Broadcasting Organizations concerned is necessary as regards payment for the control circuits and, if necessary, for the reserve circuits.



Circuits	Circuit ordered by (i.e. Broadcasting Organization to pay for circuit used)	Special repeater station which should be notified if any fault occurs on the circuit
London-Bruxelles	Bruxelles	
Bruxelles-Amsterdam	The Broadcasting Organizations of Hamburg and København should arrange beforehand which is to pay for the Bruxelles-Amsterdam circuit.	
Amsterdam-København	København	
Amsterdam-Hamburg	Hamburg	
Bruxelles-Berlin	Berlin	
Amsterdam-Berlin (reserve)	The Broadcasting Organizations concerned should decide which one of them will pay for the reserve circuit Amsterdam-Berlin.	
Berlin-Stockholm	Stockholm	
Berlin-Warszawa	Warszawa	
Berlin-Wien	Wien	
London-Berlin (control)	Berlin	

RECOMMENDATION E. 331

INTERCONTINENTAL SOUND PROGRAMME TRANSMISSIONS

1. If, in the case of a sound programme transmission over an intercontinental telephone circuit (or chain of such circuits), the facilities provided are broadly the same as those provided in respect of telephone calls, then the charge for a sound programme transmission should be the same as for a telephone call of the same duration. (See the note at the end of this Recommendation.) However, in order to take account of the circuit preparation and exchanges of telegrams or service communications necessitated by such transmissions, the minimum chargeable duration of a sound programme transmission using one or more circuits should be ten minutes.

2. An *eight-minute* surcharge shall be levied, if, for reasons over which Administrations * have no control, the *Broadcasting* Organization which has ordered the circuit informs the Centralizing Office to which it had originally applied that a *sound programme transmission* is to be cancelled less than six hours before that transmission was due to begin.

* or recognized private operating Agencies.

If, in a transmission between two countries, a single Administration * were to apply this Recommendation and were alone in levying the eight-minute surcharge for tardy cancellation, the surcharge would not be shared and would not appear in the intercontinental accounts.

3. If facilities different from those provided for the ordinary telephone service are required, the Administrations * concerned should agree between themselves the basis of charging.

4. If a sound programme transmission is provided by means of an intercontinental telephone circuit extended by means of European landlines (sound programme and telephone circuits) the charge should be assessed in principle as follows:

a) Intercontinental circuit and European telephone circuit—at the same rates as for telephone service between the terminal countries concerned, subject to a minimum of ten minutes.

b) Intercontinental circuit and European sound programme circuit:

   i) for the intercontinental circuit, at the same rate as for telephone service between the countries at the two ends of the intercontinental circuit, subject to a minimum of ten minutes;

   ii) for the European sound programme circuit, at the rate applicable to a sound programme transmission between the terminal points of the sound programme circuits in accordance with Recommendation E.330.

5. If, in the case mentioned in 4, special intercontinental facilities are provided, the charge shall in principle consist of the charges for a sound programme transmission between the terminals of the European circuits, assessed in accordance with Recommendation E.330, plus the charge for a sound programme transmission between the terminals of the intercontinental circuit, assessed as indicated in 3 above.

6. The chargeable duration for an intercontinental sound programme transmission shall commence at the time when the circuit (or chain of circuits) is handed over to the Broadcasting Organization and shall cease when the circuit (or chain of circuits) is released by that Organization. If, at the request of the Broadcasting Organization, any section of a chain of circuits is provided for use before and/or after the period of use of the whole circuit, the additional time thus made available should be charged for at the appropriate rates.

Note. — In certain recently laid intercontinental submarine cables, sound programme circuits are provided having bandwidths equivalent to one or two telephone circuits and charges are respectively equal to or twice those applied to telephone calls in the full rate period. The provision of sound programme circuits having bandwidths equivalent to three telephone circuits, at charges three times those applied to telephone calls in the full rate period, is envisaged.

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* or recognized private operating Agency (or Agencies).

CHAPTER IV

TELEVISION TRANSMISSIONS

RECOMMENDATION E.350 [1]

CONTINENTAL TELEVISION TRANSMISSIONS (EUROPEAN TYPE)

In the present state of development of the television network in Europe, the national circuits which are used for the transmission of continental television programmes are owned in most cases by the Administrations *, but in others by the national television Organizations;

The television circuits may also be used for both national and continental transmissions;

On the contrary, the programme circuits and telephone circuits associated with the television circuits, either for the transmission of the sound part of the programme or for control purposes, are owned by the Administrations * and are more liberally used than the vision circuits, and that the number of such circuits used in connection with a given television transmission may be substantial;

Moreover, the extension of a sufficient number of such circuits to the point of origin of a transmission, remote from the international exchange in the country of origin of the programme, may require special construction to be undertaken, particularly when there is also national television transmission of the event or a simultaneous national or international sound broadcast transmission of the event;

It is desirable in certain respects to distinguish between international television transmissions used by a single country only and those in which two or more countries participate;

It is desirable to ensure that satisfactory arrangements are made for the preparation, setting-up, preliminary adjustment and operation of the complex network of television circuits, programme circuits and control circuits necessary for a given television transmission;

and hence the closest co-operation is necessary between:

— the television Organizations concerned in a television transmission, either as users or as owners of television links or both,

— and the Administrations * concerned;

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* or recognized private operating Agency (or Agencies).

[1] In principle this Recommendation, which will be studied under Question 5/II in the 1968-1972 study period, applies only to the European continent.

The Television Organizations may agree to appoint a co-ordinating centre for a given continental television transmission,[1]

It is therefore *recommended* that the following conditions should be observed for continental television transmissions:

SECTION I. — GENERAL AND DEFINITIONS

1.1 *Constitution of a continental television link*

1.1.1 In considering a continental television transmission, it is necessary to distinguish between (see Figure 1):

a) the point to be regarded as that of the origin of the television transmission (point A). This point is either the actual place of origin of the programme (a studio or an outside broadcast point) or a television modulation centre of the location of a standards' converter;

b) the outgoing local end which connects point A to the first repeater station (point B);

c) the *continental* (long-distance) *television line* (line BC) which, in principle, consists of a chain of national and continental television transmission circuits, in which the national circuits are of the same quality as continental circuits;

d) the incoming local end which connects the last repeater station (point C) to point D;

e) point D, the point of destination of the television transmission. This point may be a television centre, a television transmitting station, a television modulation centre, or the location of a standards' converter.

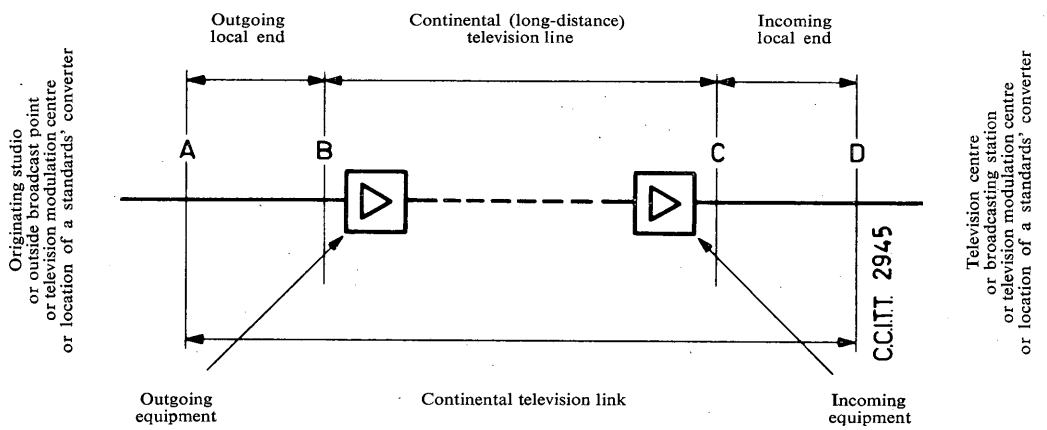

FIGURE 1 — **Diagram of a continental television link**

[1] The purpose of this centre is to:
— co-ordinate the requirements of the Television Organizations participating in the transmission in question,
— make all necessary enquiries as to the availability of television circuits,
— draw up the plan of the network of telephone circuits, programme circuits and television circuits, required for the transmission in question,
— ensure that the programme transmission proceeds normally once the television circuits are handed over to the Television Organization for the transmission in question.

1.1.2 The complete line between A and D, including the continental (long-distance) television line BC and the local ends (AB and CD) is the *continental television link.*

1.1.3 Points A and D are, as a general rule, under the control of the originating and receiving Television Organizations [1].

Points B and C are, in principle, under the control of the Administrations * of the corresponding countries.

In certain cases the exact location of points B and C may not be clearly evident. In such cases the point to be regarded as the end of the long-distance line of a particular television transmission should be fixed by agreement between the Administrations * and the Television Organizations concerned.

The continental (long-distance) television line BC is, in practically every case, under the control of the Administrations *, but certain of its component parts (which may be national or continental circuits) may be owned by Television Organizations.

The local ends may be under the control either of an Administration * or of a Television Organization, or of both jointly, according to the actual arrangements in the countries concerned.

Note. — The term *long-distance line* is used here in a very general sense, applying equally to metallic lines (in cables or wave guides) and to radio-relay links.

1.2 *Categories into which television transmissions may fall*

Distinction is made between the following categories of television transmissions:

1.2.1 Regular television transmissions *(transmissions télévisuelles périodiques)*, which are ordered once and for all because they take place at regular intervals, at fixed times, over the same routes and always between the same points.

1.2.2 Occasional television transmissions *(transmissions télévisuelles occasionnelles)*, being all those which do not fall within the definition of regular transmissions.

1.2.3 Simple television transmissions *(transmissions télévisuelles simples)*, which are transmissions between points in two different countries, the programme being originated in one country and broadcast either in the other only, or in both.

1.2.4 Duplex simple television transmissions, being transmissions between points in two different countries, the programme being originated at the same time in both countries and broadcast in both. So far as this Recommendation is concerned, these transmissions are treated as two separate simple television transmissions.

1.2.5 Multiple television transmissions, with only one point of origin for the programme *(transmissions télévisuelles multiples, avec un seul point de captation d'images)*, being transmissions in which a programme originates in one country and is transmitted simultaneously to two or more other countries (in addition, as may be, to being broadcast in the country of origin).

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* or recognized private operating Agencies.

[1] If an Administration * takes responsibility for a standards' converter, or for a television modulation centre or for a television broadcasting station, it is to be treated as a Television Organization for the purpose of this Recommendation.

1.2.6 Multiple television transmissions with several points of programme origination, in which the programme originates from different points either in one country or in different countries and is broadcast in two or more other countries (in addition, as may be, to being broadcast in the country of origin).

1.3 *Circuits used in a television transmission*

The following different classes of circuit are used in each continental television transmission:

a) *Television circuit.* — A circuit, either in a cable or a radio-relay link, which transmits the vision signal from one point to another.

b) *Sound programme circuit.* — A special circuit for the transmission of the sound component of the television programme as dealt with in C.C.I.T.T. Recommendation E.330.

c) *Control circuit.* — As defined in C.C.I.T.T. Recommendation E.330.

1.4 *Testing period and preparatory period*

Distinction is made, for each continental television transmission, between:

a) the *testing period* during which the Administrations * carry out the adjustment of the continental television line before handing over to the Television Organizations;

b) the *preparatory period* during which the Television Organizations carry out their own adjustments, tests and various operations before proceeding to the actual television transmission;

c) the *television transmission* itself.

SECTION II. — CONDITIONS OF ACCEPTANCE

2.1 Requests for the use of circuits for television transmissions must be addressed by he Television Organization or Organizations, to which the point or points for which the programme is destined belong (broadcasting station or studio of a Television Organization) to the controlling service of its (or their) country (or countries), this controlling service being the same as that designated for programme transmissions.

Requests for the use of circuits for television transmissions (television circuits, programme circuits, and control circuits) must be made as soon as possible, and in any case at least 4 working days before the transmission, in order to allow the Administrations * concerned to take the necessary steps to organize the television transmission in question. Each request for circuits for a television transmission must be accompanied by an undertaking to pay the charges relating to the use of the circuits, as well as any special expenses which may be incurred. These requests will be met provided the general public telephone service does not suffer and the prevailing conditions allow. If requests have not been made within the 4 working days mentioned, Television Organizations may not claim a reduction in charges for an interruption or any other incident arising on the broadcast or television transmission circuit during the preparatory period or during actual transmission when it has not been possible to adjust and test the circuit with the necessary care, owing to insufficient time being available.

* or recognized private operating Agencies.

2.2 *Continental transmissions with only one point of destination* [1]

For each continental television transmission with only one point of destination the responsible Organization should, after preliminary agreement with the Television Organization originating the programme, make a request to the controlling service of its country to place at its disposal the necessary:

— television circuits,
— programme circuits,
— control circuits.

However, subject to agreement between the Administrations * concerned and to the receipt of a general notification to that effect by the Television Organizations concerned:

— in the case of a transmission between adjoining countries, each Television Organization may order the part of the television line in its own national territory from its own Administration *;
— in the case of a transmission with transit, the same procedure may be followed, but one or other of the Television Organizations (by prior agreement amongst themselves) should also order from the controlling service of its own Administration * the part of the television line in the transit country.

2.3 *Several points of destination of the programme*

2.3.1 *General procedure*

For continental television transmissions serving programme destination points in several countries, the procedure is as follows:

The Television Organization which is to originate the programme sends to each of the Television Organizations concerned (participating Organizations), a list of the points of destination of the programme; each Television Organization forwards this list to the controlling services of its own country after having added to it any changes or additions it considers necessary. This list should include particulars of all the circuits required (television circuits, programme circuits and control circuits) and, as appropriate, of any reserve circuits which may be required.

Unless otherwise agreed upon, the controlling service of the country in which the programme originates is the overall controlling service for the transmission concerned.

This overall controlling service should inform each of the controlling services concerned, at the earliest possible moment, of the circuits to be used, together with particulars of the repeater stations (on cables or on radio-relay links) with which the Television Organizations may communicate, if any unforeseen incident, which must be dealt with urgently, arises during transmission.

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* or recognized private operating Agency (or Agencies).

[1] This heading will be considered as covering the case in which there are several effective points of destination for the programme, all depending on the same television authority in a given country (several transmitting stations) fed from one or more junction points in this country. The point of destination of the programme will in this case be the first junction point encountered.

As soon as each Television Organization responsible for one or more points of destination of the programme receives the necessary information about the circuits for the use of which it will have to pay, it should send *without delay* to the controlling service of its own country a request for the use of these circuits.

To facilitate this procedure, it is desirable that the Television Organizations should study in advance the cases of multiple transmissions which are likely to occur frequently.

2.3.2 *Procedure to be followed when there is a co-ordinating centre*

When the Television Organizations agree to set up a co-ordinating centre for a given television transmission, the procedure should be as follows:

The co-ordinating centre, set up by the Television Organizations concerned, first finds out which Television Organizations intend to participate in the transmission. The centre then finds out, by enquiry of the Administrations * and of the Television Organizations concerned whether the circuits required for the transmission are likely to be available on the date and at the time required. After having established all the details of the circuits to be ordered by each participating organization, the co-ordinating centre publishes and distributes, as early as possible, and at least 14 days before the date of the transmission, to all the Television Organizations and controlling services concerned, a complete schedule of circuit requirements for the transmission.

During this phase of exchange of information, the Television Organizations are not placed under any obligations to pay for any expenses incurred, and the Administrations * are under no obligation to begin any of the special work which may be necessary when orders are received.

2.3.3 *Television circuits*

At least four working days before the date of the transmission, each participating Television Organization should forward to the controlling service of its country a request for the use of the television circuits for which it will have to pay.

Any television transmission circuits required for use by one participating Television Organization only should be ordered by that organization from its national controlling service.

Television transmission circuits which are required for the use of more than one participating Television Organization are ordered as follows:

Each of the Television Organizations concerned orders from its own controlling service the section of the continental line(s) between:

— the point on the continental (long-distance) television line serving its participating broadcasting station which is furthest " downstream ", and

— the point " upstream " on the line serving the last participating station in the preceding participating country.

The Administration * of the participating country nearest to the country of origin orders the remaining section from the controlling service of the Administration * of the country of origin.

* or recognized private operating Agencies.

Where a bifurcation of the continental television line occurs in a given transmission, the Television Organizations jointly served by the section of circuit prior to the point of bifurcation should agree amongst themselves which should order that section; in such a case, therefore, one Television Organization should order the section between its participating station and the nearest participating station " upstream " in the preceding participating country, and each of the other Television Organizations should order the section between its participating station and the point of bifurcation.

When, by prior general notice to the controlling service of its country, a Television Organization which owns a continental television circuit has announced its intention to charge for the use of the circuit for continental transmissions, the Administration * receiving an order collects the appropriate charges and enters them in the international accounts. The creditor Administration * makes an appropriate settlement with the Television Organization which owns the circuit.

2.3.4 *Programme circuits*

Requests for programme circuits should be made in accordance with the procedure set out in C.C.I.T.T. Recommendation E.330.

2.3.5 *Control circuits*

Control circuits should be ordered according to the same principles as for the television circuits and programme circuits with which they are associated.

As regards the number and setting-up of the control circuits to be provided, the following directives should be observed:

2.3.5.1 *Control circuits associated with television circuits*

2.3.5.1.1 *Simple television transmissions.* — At least one control circuit must be provided between points A and D of Figure 1 for a simple television transmission, whether occasional or regular.

2.3.5.1.2 *Multiple television transmissions*

a) Multiple television transmissions in which there is only one point of origin: if the first point of bifurcation of the television circuits feeds a television transmitting station (or a switching centre or a telerecording centre) in the same town and participating in the multiple transmission, it is recommended that control circuits should be provided at least:

— between the point of origin of the pictures and the first point of bifurcation of the television transmission circuits,

— between this point of bifurcation and the various television transmitting stations (or switching centres or telerecording centres).

Where this is not the case, it is recommended that control circuits should be provided, as far as possible, between the point of origin of the picture on the one hand and the various television transmitting stations (or switching centres or telerecording centres) on the other.

* or recognized private operating Agency.

In the two cases described above these control circuits should be prescribed not only during the preparatory period but also during the whole programme transmission.

b) Multiple television transmissions with several points of origin: a preliminary study should be made between the Television Organizations and the Administrations * concerned in order to determine what control lines are necessary.

2.3.5.2 *Control circuits associated with programme circuits*

The rules given in C.C.I.T.T. Recommendation E.330 are applicable.

2.3.5.3 *Note 1.* — In cases where a co-ordinating centre exists for the international television programmes, this centre having been set up by agreement between the various Television Organizations concerned, the requirements for control circuits terminating at this centre are determined by agreement between the Television Organizations and the Administrations *.

2.3.5.4 *Note 2.* — If the Television Organizations elect to dispense with:

— the control circuits, which normally must be associated with programme circuits,

— or with the control circuits which normally must be associated with television circuits,

these organizations shall not be entitled to claim any reduction of charge on account of any fault or interruption occurring on the programme or television circuits either during the preparatory period or during the transmission of the programme proper, if such fault or interruption could not be quickly remedied because of the absence of the control circuits.

SECTION III. — CHARGING

3.1 *Sound programme circuits and telephone circuits*

The sound programme circuits and telephone circuits, used in connection with continental transmissions of television programmes, are circuits which can also be used by users other than the Television Organizations;

It is therefore *recommended* that the use of such circuits in connection with the transmission of television programmes should be charged for as follows:

3.1.1 Sound programme circuits:

— in accordance with the rules set out in C.C.I.T.T. Recommendation E.330, subject to what follows herein as to rebates for faults and interruptions.

3.1.2 Control circuits:

— as for the use of ordinary telephone circuits, that is, without surcharge.

3.2 *Television circuits*

The provision of television circuits for continental television transmissions involves the Administrations * in the construction of special and costly plant set aside for the purpose;

* or recognized private operating Agencies.

Studies of net costs of continental television circuits carried out in 1955/1956 took into account the cost of lines and of terminal stations;

The costs of television lines on radio-relay links and in coaxial cables are sufficiently close to enable one amount to be used for either type of circuit;

The amounts of cost resulting from studies in 1955/1956 were based on the hypothesis of an average use of continental television circuits corresponding to an exchange of programmes (in both directions of transmission) between the two centres served by a circuit, of 500 hours per annum;

This hypothetical duration of use is very much greater than the use actually made of television circuits in 1956;

Nevertheless, it is desired to give the maximum encouragement to the development of continental television exchanges by keeping the charges for them as low as possible;

— It is therefore *recommended*: that the use of continental television circuits should be subject to the following charging rules:

— that the charge for 3 minutes' use of a continental television circuit, given below (being a charge somewhat less than the net cost on the basis of 500 hours' use per annum), could be revised when the use of television circuits increases substantially above an average of 600 hours' use per annum for television programmes in both directions of transmission between two centres.

3.2.1 *Charging rules for television circuits*

The use of continental television circuits is subject to a charge and a surcharge.

a) The *charge* for each 3 minutes of use of such a circuit is 20 gold francs per 100 km of television line (crowflight)[1]. For each minute, or fraction of a minute, after the first 3 minutes of use, the charge is one-third of the above charge.

In determining the distances, the *continental television circuit itself* only should be taken into account, any extension of the circuit which may be necessary in setting up a continental television link being excluded. The distances should be taken as:

— in the case of the *terminal charge*, the crowflight distance between the point of origin fixed for the circuit [2] and the point where the circuit crosses the frontier. (In order to take better account of the cost actually incurred with a radio-relay link, the point *midway* between the two stations on either side of the frontier may be used, instead of the actual point of crossing of the section of the link straddling the frontier);

— in the case of the *transit charge*, the crowflight distance between the points of crossing the frontier by the continental circuit. (As in the case of the terminal charge, the point of crossing the frontier by a radio-relay link can be taken as the mid-point between the two stations situated on either side of the frontier.)

[1] This figure takes into account the costs relating to two terminal stations.

[2] The Administrations or recognized private operating Agencies concerned should fix by mutual agreement the points at which each continental television circuit begins and ends.

Crowflight distances should be rounded up as follows:

— each fraction less than 50 km is rounded up to 50 km maximum,

— each fraction between 50 and 100 km is rounded up to 100 km maximum.

When the actual route of a continental circuit is very much greater than the crow-flight distance as defined above, the Administration * of the country concerned may increase the charge (terminal or transit) which it makes by an appropriate factor.

b) A *surcharge* is collected for each television transmission corresponding to 30 minutes' use of each television circuit actually used in the transmission in question. The surcharge is made to take account of the costs incurred in setting up, testing and regulating the continental television link, as well as of the supplementary expenses for personnel and material arising from the exchange of telegraph and telephone orders for the preparation, setting up and testing of the link. This surcharge is shared between the Administrations * concerned on the same basis as the charge for the television transmission itself.

The surcharge is due if, for reasons not within the responsibility of the Administrations *, the Television Organization which ordered the circuit requests the controlling service from which it ordered the circuit to cancel the television transmission in question at less than 12 hours notice before the transmission is due to start.

The surcharge is not payable if the television transmission does not take place for reasons within the control of the Administrations *.

c) In addition, any *special expenses* which may be incurred by an Administration * in extending continental television circuits from the continental terminal are also payable.

3.2.2 Any recording of a television programme made by an Administration * or Television Organization for transmission of that programme at a later date is, for charging purposes, treated as though it were an immediate transmission of the programme in question.

3.2.3 *Calculation of charges*

The charges (charge and surcharge) relative to the use of the television circuits in a transmission are debited to the Television Organizations according to their undertaking to pay for the circuits in question on ordering them. They are due for the whole period during which the continental telephone line is placed at the disposal of the Television Organizations concerned; the period of preparation before the start of the transmission proper is included in the period.

The supervision of a continental television transmission is effected by a repeater station designated by the Administration *. When a television circuit is owned by a Television Organization, this station is designated by that organization.

The technical officers of the designated repeater stations should come to an arrangement between themselves so as accurately to fix at the end of the television transmission:

a) the time of handing over the television line to the Television Organization (beginning of chargeable duration);

* or recognized private operating Agency (or Agencies).

b) the time at which the television line is released by the Television Organization (end of chargeable duration);

c) where appropriate, the times and durations of every interruption or incident which may have occurred (in order to determine whether a rebate is due, and if so, its amount).

The times of the beginning and of the end of the chargeable duration, as well as the time of occurrence and duration of any breakdowns which may occur, are entered on a daily report.

This daily report is sent on the same day to the service responsible for co-ordinating all the details necessary for the establishment of the international accounts.

The amount of any special expenses incurred by the Administration * in the country of origin of the programme should be notified by that Administration * by telegram to the controlling service of the participating Television Organization which has ordered the long-distance line or the local ends. The controlling service concerned should inform the Television Organization of its country of the amount of special expenses payable and should pass the appropriate credits to the Administration * of the country of origin of the programme through the international accounts.

3.2.4 *Interruptions. — Rebates*

If during the course of a continental television transmission a fault or interruption, even of short duration, occurs:

— whether on the television link as a whole,
— or in a section of that link,
— or on one or more of the programme circuits associated with the television transmission circuits,

it is necessary to consider to what extent the value of the relay has been reduced for the Television Organization or Organizations affected by the fault or interruption.

Administrations * should adopt, provisionally, the following principles in dealing with faults or interruptions.

In general, if a Television Organization continues to broadcast or to record the transmission received either over the television line or over a programme circuit, the charges in respect of all circuits of which it makes use remain payable in full. If, however, as a result of a fault or interruption on the television circuit, broadcast of the transmission is necessarily discontinued by one or more participating Television Organizations, a rebate in respect of any sections of the television and programme circuits which served that Television Organization (or those Television Organizations) exclusively may be allowed on request from the organization(s). Any sections of continental television and programme lines used by any television station which continues to broadcast the received transmission remain payable in full. Similarly, if in such circumstances broadcasting of either the television or the sound programme (but not both) is necessarily discontinued by a participating Television Organization, a rebate in respect of the sections of either the continental television lines, or of the programme circuits concerned (but not both) may be made on a request being received.

* or recognized private operating Agency (or Agencies).

It will be for the Administration * of the country of the receiving Television Organization to assess the validity of any claim for rebate, and to assess the rebate to be made, where necessary, in consultation with the other Administrations * concerned. In the event of disagreement, the opinion of the Administration * of the country of the receiving Television Organization should prevail over that of the other Administrations * concerned. It goes without saying that such a reduction should be applied only if the interruption or incident has been caused through service deficiencies or a case of *force majeure* (see, in particular, the note 2.3.5.4).

RECOMMENDATION E.351

INTERCONTINENTAL TELEVISION TRANSMISSIONS VIA SATELLITES

Introduction

The procedures for intercontinental and the procedures for continental television transmissions should be compatible so far as possible.

Although the availability of facilities for intercontinental television transmissions via satellite may be limited for some time, and the operational use of satellite systems for television transmissions is still subject to development and rapid change, it is *recommended* that the following principles should be observed for intercontinental television transmissions via satellite:

SECTION I — GENERAL AND DEFINITIONS

1.1 *Constitution of an intercontinental television connection via satellite (see Figure 1)*

1.1.1 An intercontinental television connection consists of:

1) a national or continental television circuit at the originating end;
2) an intercontinental television circuit; and
3) national or continental television circuit(s) at the receiving end(s).

1.1.2 The intercontinental television circuit consists of:

— a satellite sector between and including the earth stations at each end (in some cases reception may be at more than one earth station) and

— any terrestrial facilities at each end to a designated international television centre [1] hereinafter called " Satellite International Television Centre (S.I.T.C.) ".

* or recognized private operating Agency (or Agencies).

[1] *Note.* — Definition of International Television Centre (I.T.C.) (Recommendation N.50), Volume IV of the *White Book*:

"A centre at which at least one international television circuit terminates and in which international television connections can be made by the interconnection of international and national television circuits.

" The I.T.C. is responsible for setting up and maintaining international television connections and for the supervision of the transmissions made on them."

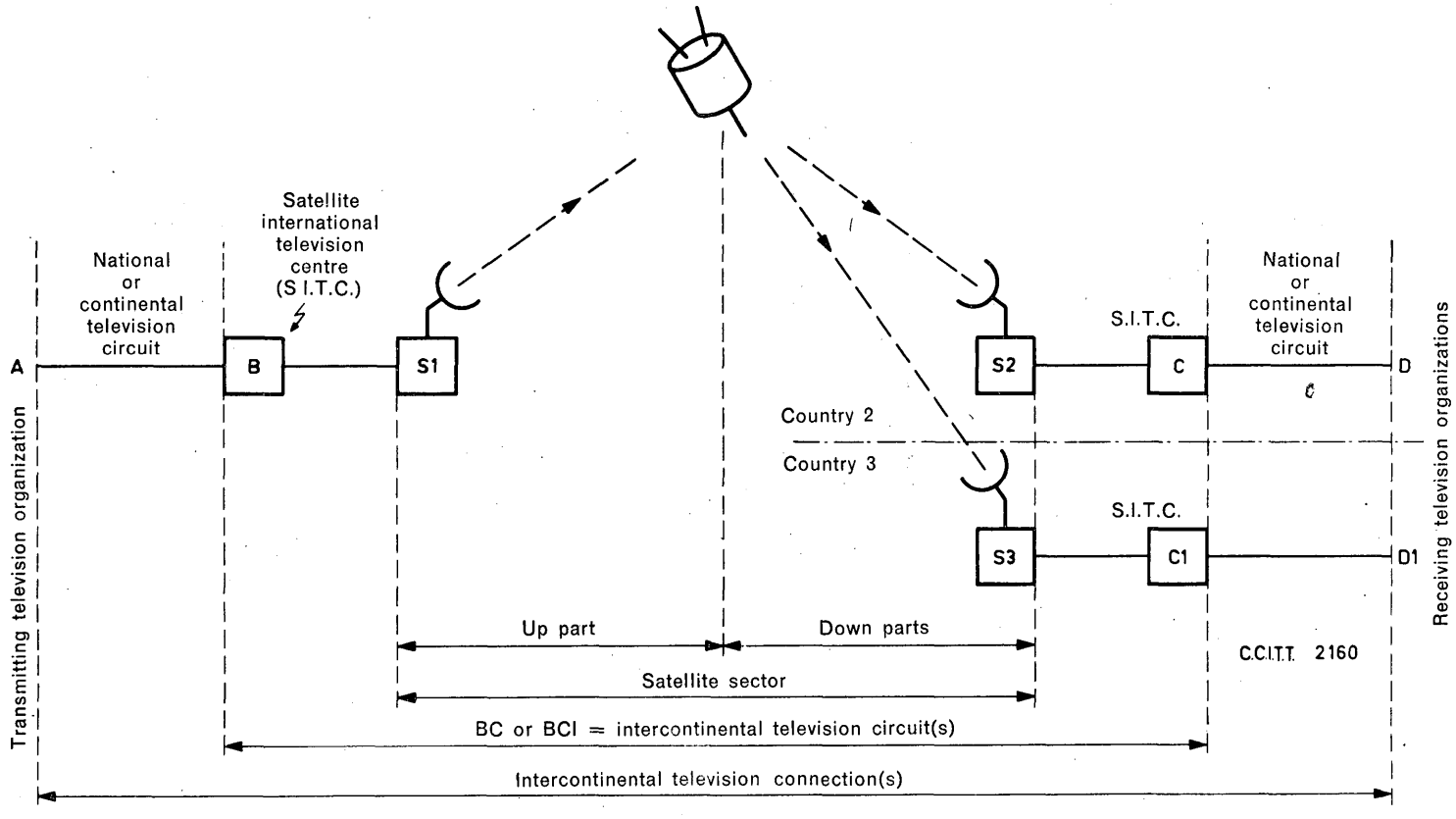

FIGURE 1. — **Example of an intercontinental television connection**

An S.I.T.C. or S.I.T.C.s should be designated to apply to all television transmissions in a particular relationship by each Administration * concerned.

1.1.3 The satellite sector may be considered as including an "*up*" *part* and one or more "*down*" *parts*. The "up" part and "down" parts meeting at the "mid-point" [1] of the satellite sector.

1.1.4 This Recommendation applies to the intercontinental television circuit.

1.2 *Categories into which intercontinental television transmissions may fall*

1.2.1 Television transmission is considered to be unidirectional. Where transmission is required in two directions (duplex transmission) it is treated as two separate unidirectional transmissions.

1.2.2 a) *Regular transmissions* are ordered to take place at regular intervals, at fixed times, between the same points. These transmissions may also be offered on a leased circuit basis with a specified minimum contract period, such as one month;

b) *Occasional transmissions* are all those which do not fall within the definition given in 1.2.2 a).

1.2.3 a) *Monochrome transmissions;*

b) *Colour transmissions.*

1.2.4 a) *Simple intercontinental transmissions* are transmissions with only one transmitting S.I.T.C. on the transmitting end and only one S.I.T.C. on the receiving end.

b) *Multiple intercontinental transmissions* are transmissions:

— with only one S.I.T.C. on the transmitting end and which are received through a given satellite at more than one S.I.T.C.;

— with more than one S.I.T.C. on the transmitting end and which are received through a given satellite.

1.3 *Components of an intercontinental television circuit*

1.3.1 The intercontinental television circuit normally has two components — vision and sound. Normally these components are furnished on a combined path but may in some instances be furnished on separate paths. In some cases more than one sound and/or control circuit may be provided.

1.3.2 Additional sound and control circuits not covered by paragraph 1.3.1 above that may be required by the Television Organizations are not considered as part of the intercontinental television circuit. Such additional sound and control circuits are provided in accordance with the normal procedures governing such intercontinental circuits.

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* or recognized private operating Agency.

[1] Not to be considered as the half-way distance of the satellite sector expressed in miles or kilometers.

1.4 *Line-up and preparatory periods* [1]

These periods are:

a) the line-up period during which the Administrations * carry out the adjustment of the television circuit before handing it over to the Television Organizations;

b) the preparatory period during which the Television Organizations carry out their own adjustments, tests and various operations before proceeding to the actual transmission;

c) the transmission itself.

SECTION II. — CONDITIONS OF ACCEPTANCE

2.1 Orders for the use of circuits for intercontinental television transmission will be met subject to availability of facilities.

2.2 *Orders by the customer*

Orders for the use of such circuits from a Television Organization (or other customer) should be addressed to the Administration * in its own country. Each order, which should be clearly identified as such, carries with it an undertaking to pay the charges relating to the use of the circuits as well as any special expenses which may be incurred in connection with the order. Circuits will not be reserved on the basis of enquiries as to their availability.

Orders should be placed as soon as possible and preferably at least four working days before the transmission.

2.3 *Handling of orders received by Administrations* *

1) The Administration * receiving the order is responsible for arranging the circuits between the Television Organization and an appropriate S.I.T.C.

2) The Administration * operating this S.I.T.C. is responsible for confirming the availability of the intercontinental circuits and for ordering its portion of such circuits.

3) The Administration * operating the other S.I.T.C. is responsible for ordering its portion of the intercontinental circuits and for arranging the circuits between the S.I.T.C. and the Television Organization(s).

4) The additional sound and control circuits, referred to in 1.3.2, should be ordered in accordance with the normal procedures governing such international circuits.

5) Confirmation should be passed back to the ordering Administration * as soon as possible.

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* or recognized private operating Agency (or Agencies).

[1] See Recommendation N.54.

Note 1. — 1, 2 and 3 above are not intended to affect such ordering procedures as may be agreed between Administrations *.

Note 2. — Appropriate arrangements should be made to ensure that at the time of a television transmission operational information is relayed speedily between the Television Organization(s) and the Administration(s) * concerned.

SECTION III. — CHARGING

3.1 *Regular transmissions (leased circuit service included)*

(No recommendations have been developed as yet for these items.)

3.2. *Occasional transmissions*

The part of the intercontinental circuit between a satellite and the S.I.T.C. is subject to charges established by the Administration * controlling that portion. These charges for the time being should conform to the following general principles, unless otherwise agreed by Administrations *.

3.2.1 A minimum charge should be made covering an initial chargeable period [1], hereafter referred to as " initial period charge ", plus a per-minute charge for each minute or part of a minute thereafter.

3.2.2 For consecutive transmissions ordered by different Television Organizations using the same intercontinental circuit, only one initial period charge may be made, as though they amounted to one single transmission. The duration of each of the consecutive transmissions should then be considered for purposes of calculating charges at least as long as an initial chargeable period.

3.2.3 *Special charging procedures (where applicable).* — If the chargeable duration extends over the different charging periods the initial period charge should be that applicable at the time the chargeable period begins, subsequent minutes being charged for at the appropriate charge for the applicable charging period.

3.2.4 If different charges apply for different categories of service — for example, monochrome and colour — for a transmission using more than one category, the highest initial period charge should be applied for the initial period, without regard to the category of service actually furnished at the start of the transmission, and subsequent minutes should be charged for at the rate applicable to the category of service actually provided. For charging purposes, each category of service should be considered to be at least as long as an initial chargeable period, except for the category furnished last.

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* or recognized private operating Agencies.

[1] In 1968 the practice of the Administrations or recognized private operating Agencies providing intercontinental television service was to use an initial period charge of 10 minutes.

3.2.5 *Allowance for interruptions (rebates).* — In principle, it is desirable that:

— in the event of a fault in the intercontinental connection which causes an interruption for a period longer than 10 seconds, and when the interruption affects the vision component only or both the vision and sound components, credit for each interruption should be allowed by each Administration * in its charges for its portions of the intercontinental connection in multiples of one minute for each minute or fraction thereof of interruption;

— when an interruption involves only the sound component of the intercontinental connection, credits for each interruption should be allowed in multiples of one minute for each minute or fraction thereof that the interruption has lasted. For the intercontinental circuit, the amount of credit for one minute of interruption should be approximately equal to the charge for one minute of use of an intercontinental programme circuit of equivalent quality between the same points;

— two or more interruptions during any one minute shall be considered as one interruption.

3.3 *Calculation of charges*

3.3.1 Chargeable time normally starts when the intercontinental circuit is made available to the Television Organizations (beginning of preparatory period).

3.3.2 Chargeable time ends, for both the continental and the intercontinental television circuits, when the Television Organization advises the Administration * which received the order that the intercontinental television connection is no longer required.

3.3.3 In the event of disagreement, the opinion of the Administration * of the country of the receiving Television Organization should prevail over that of the other Administrations * concerned.

* or recognized private operating Agency (or Agencies).

PART IV

STATISTICS ON INTERNATIONAL TELEPHONY AND SERVICE QUALITY

CHAPTER I

STATISTICS

RECOMMENDATION E.400

GENERAL TELEPHONE STATISTICS

1. It is *recommended* that the General Telephone Statistics be published each year by the I.T.U. General Secretariat in the form indicated on the following page.

2. Administrations * should furnish the information as quickly as possible at the beginning of each year, in order that the statistics for a given year may be published at the latest in the middle of the following year.

* or recognized private operating Agencies.

GENERAL TELEPHONE STATISTICS

I. Population of the country *(Note 1)* . . . .

II. Number of main telephone stations *(Note 2)*

a) manual (without dial) . . . .

b) automatic (with dial or key-set) . . . .

III. Number of telephone stations of all kinds (main, extension, public, service, etc.) having access to the general telephone network . . . .

IV. Telephone density: Number of stations of all kinds per 100 inhabitants .....

V. Recorded or estimated outgoing telephone traffic *(Note 3)*

a) Traffic recorded *on subscribers' meters*

Total number of pulses:

i) national traffic . . . .

ii) international traffic . . . .

(or)

Estimate of number of conversations:

i) national traffic . . . .

ii) international traffic . . . .

b) Traffic recorded *automatically* on tickets, tapes, etc.

Total number of conversations:

i) national traffic . . . .

ii) international traffic . . . .

c) Traffic recorded *manually* on tickets, cards, etc.

Total number of conversations:

i) national traffic . . . .

ii) international traffic . . . .

d) Traffic covered by a *fixed-charge system*

Total number of pulses . . . .

(or)

Estimate of number of conversations . . . .

e) Total traffic

Total number of conversations:

i) national traffic . . . .

ii) international traffic . . . .

Explanatory notes

Note 1

The figures appearing under this heading will be taken from the United Nations Statistics. They will be sent each year to all countries along with the Telephone Statistics form.

Note 2

A main station is defined in No. 13.21 of the *List of definitions of essential telecommunication terms*, as follows:

" Main station: a subscriber's station which is used for originating calls and on which incoming calls from the exchange or from an extension station are answered ".

This definition may cause confusion, particularly as the French and English versions do not quite correspond.

To overcome this difficulty, and for the purposes of Recommendation E.400, the term " main station " should be interpreted as follows:

" A ' main station ' within the meaning of heading II is a telephone station which has a corresponding number in the telephone exchange equipment. It is understood that:

— the line connecting the main station to the telephone exchange may be either an exclusive exchange line or a shared line;

— when a subscriber's station has several extensions (private branch exchange), the number of main stations is equal to the number of lines connecting the installation to the telephone exchange, whether these lines are operated in one direction or in both directions.

Example: A subscriber's station with extensions is served by 50 lines which connect it to the telephone exchange. The installation has 10 operating positions (and, therefore, 10 ' operator's stations ') and 500 extensions.
In accordance with the above definition, this installation must be counted as having *50 main stations* (i.e. as many stations as there are subscriber lines connecting the installation to the exchange). It will not, on the other hand, be counted as having:

— either *one* main station (which would refer to the installation),

— or *10* main stations (which would correspond to the number of stations at operating positions)."

It will thus be seen that according to this definition the number of main stations to be entered under heading II of the Statistics is equal to the number of " exclusive exchange lines ".

Note 3

Under this heading, Administrations * should supply any data they possess; it is for them to decide whether to fill sub-headings a) to e) in full or in part. If necessary, they can bracket together results coming under several headings.

RECOMMENDATION E.401

STATISTICS FOR THE INTERNATIONAL TELEPHONE SERVICE (NUMBER OF CIRCUITS IN OPERATION AND VOLUME OF TRAFFIC)

(statistics exchanged by Administrations *)

Administrations * exchange each year, *in February*, statistics showing the number of circuits used and the volume of traffic monitored in the preceding year, as well as estimates of the number of circuits which will be required three years and five years later. These statistics shall be drawn up in the form indicated below.

A copy of the statistics shall be sent to the C.C.I.T.T. Secretariat for information.

* and recognized private operating Agencies.

INTERNATIONAL TELEPHONE TRAFFIC STATISTICS

Year: .....

Circuits	Number of circuits in service		Number of circuits required		Method of operation	Destination of traffic	Busy-hour traffic		Start of busy-hour (GMT)	Annual traffic increase	Estimated number of circuits		Observations
	Out-going	Both-way	Out-going	Both-way			Month	Erlangs			in 3 years	in 5 years	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
(examples)													
Zürich-København	24	—	20		SA	Terminal	X	8	10.00	15%			
						Sweden *	X	4	10.15	12%			*Overflow traffic on Zürich-Stockholm connection
						Norway	X	2	09.45	13%			
						Finland	X	1	10.30	7%			
						Total	X	15	10.00	14%	28	32	
Zürich-Stockholm	12	—	11		SA	Terminal	IX	5.5	10.15	12%	13	15	

ANNEX

(to Recommendation E.401)

How to fill in the table on international telephone traffic statistics

Column 1. — Designation of the connection by giving the name of the outgoing exchange first and then the name of the incoming exchange. Two-way connections will be shown in alphabetical order.

Columns 2 and 3. — Number of circuits in operation as on *31 December* of the year of the statistics. The number will be shown in column 2 when it refers to outgoing circuits and in column 3 when it refers to both-way circuits.

Columns 4 and 5. — Number of circuits which would have been required during the year of the statistics.

Column 6. — Method of operation.

The following abbreviations will be used:

A	for automatic,
SA	for semi-automatic,
M	for manual,
A + SA	for automatic and semi-automatic.

Column 7. — Destination of traffic.

Each relation will be shown in this column on a separate line.
In the example given, the traffic routed over the Zürich-København circuits is destined for Denmark (terminal), Sweden, Norway and Finland (transit). In this case, the data for each destination will be shown in columns, 8, 9, 10, and 11. The total traffic figure, however, should not be omitted. These data will be bracketed together. If the connection handles traffic only to the country in which the incoming exchange is situated, only the word " terminal " will appear in column 7.

Columns 8 and 9. — Busy-hour traffic, expressed in *erlangs*. (See Recommendation E.100.)

The traffic measured during the busiest month of the year of the statistics is given in column 9. For two-way circuit groups the total amount of incoming and outgoing traffic should be given. In column 8 the month of the year during which the traffic was measured should be indicated in roman numerals.

Column 10. — Busy hour (G.M.T.).

This refers to the busy hour as defined in Recommendation E.100.

Column 11. — Annual increase, in %. Each Administration * should insert in this column the annual traffic increase rate with respect of the previous year.

Columns 12 and 13. — Columns 12 and 13 should show the estimated number of circuits required to route traffic in three and five years' time, respectively. For example, if the statistics relating to 1964 are drawn up in February 1965, column 12 will give the estimated number of circuits required in 1968 and column 13 those required in 1970.

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* or recognized private operating Agency.

RECOMMENDATION E.402

PUBLICATION BY THE I.T.U. GENERAL SECRETARIAT OF THE " LIST OF INTERNATIONAL TELEPHONE ROUTES "

1. The General Secretariat of the I.T.U. establishes and keeps up to date the " List of international telephone routes " showing, for the various services:

— the primary routes,
— the secondary routes,
— the emergency routes.

2. By referring to the " List of routes ", the Administration * responsible for the presentation of the accounts may ascertain via what country(ies) the call diverted to an emergency route has been established.

* or recognized private operating Agencies.

Volume II-A **Volume VI**

PART IV PART IV

CHAPTER II

CHECKING THE QUALITY OF THE INTERNATIONAL TELEPHONE SERVICE

RECOMMENDATION E.420 RECOMMENDATION Q.60

The methods of measuring the quality of service are as follows:

1. Service observations;
2. Test calls (simulated traffic);
3. Customer interviews (see note at the end of this Recommendation.)

Administrations * are recommended to draw up a programme for observations and tests designed for assessment of circuits and equipment, supervision of operators and evaluation of the quality of service given to subscribers. It would be desirable if telephone Administrations * were to exchange statistics on quality of service directly, and immediately after they have been made out, in accordance with Tables I, II and III in Recommendations Q.61, Q.62 and Q.63.

Table I in Recommendation Q.61 relates to the observations on the outgoing end on the quality of international automatic and semi-automatic service. It provides in particular a check of the percentage of unsuccessful calls due to technical faults (equipment shortages or failures).

Table II in Recommendation Q.62 relates to observations on traffic set up by operators. It provides, in manual and semi-automatic service, a means of determining the efficiency of international circuits, of assessing the work of operators and the quality of transmission.

Table III in Recommendation Q.63 is used to record the results of test calls undertaken especially when the observations shown in Table I make it clear that the percentage of faults is too high.

Note. — Customer interviews were also suggested during the study period 1964-1968 for ascertaining opinions on service quality. This question of using customer interviews will be studied during the period 1968-1972 (see Question 12/XIII).

* or recognized private operating Agencies.

RECOMMENDATION E.421 RECOMMENDATION Q.60 *bis*

SERVICE QUALITY OBSERVATIONS

SECTION 1. — DEFINITIONS

1.1 *Service observation*

Monitoring to obtain a complete or partial assessment of the quality of telephone calls, excluding test calls.

1.2 *Manual observation*

Monitoring of telephone calls by an observer without using any automatic data-recording machine.

1.3 *Automatic observation*

Monitoring of telephone calls without an observer.

1.4 *Semi-automatic observation*

Monitoring of telephone calls using equipment which records some data automatically. For example, equipment in which information such as exchange being observed, number dialled by the subscriber, metering pulses and time of call are recorded automatically on some means suitable for data processing. The observer merely has to key in a code indicating the condition observed.

SECTION 2. — RELATIVE MERITS OF MANUAL, AUTOMATIC AND SEMI-AUTOMATIC OBSERVATIONS

2.1 The three methods mentioned above in 1.2, 1.3 and 1.4 are not exclusive, for example: automatic observations may be used to supplement observations taken by an operator. It is considered in 1968 that the need for automatic observations will increase in view of the heavy cost associated with manual or semi-automatic observations on the rapidly expanding international network. It is also considered that automatic observations will not entirely supersede observations taken by an observer within the foreseeable future.

The relative merits of the three methods can be assessed as follows:

2.2 *Manual observations*

Provides all the data required in Tables 1 and 2.

Observations can be carried out with a minimum of equipment.

Observations can permit the detection of a number of abnormalities which cannot be detected automatically, e.g. very poor speech transmission [1] or difficulty with audible tones encountered in the international service [2].

[1] Item 3.7 of Table 1.

[2] Item 4.4 of Table 1.

2.3 *Automatic observation*

Operating cost is minimum (staff reduction).

Continuous observation is possible.

It is possible to have a larger sample.

Human error is eliminated.

Automatic processing of data is facilitated.

Conversational privacy is ensured.

Control of the time at which observations are made is facilitated.

2.4 *Semi-automatic observation*

Provides all the data required in Tables 1 and 2.

There is a saving in staffing costs compared with manual observation.

Greater accuracy compared with manual observation is possible due to the fact that there is an automatic recording of the number dialled, the time of the call, etc.

It is possible for the observer to give more attention to the more critical conditions being checked during observations of calls.

The results are produced in a form suitable for subsequent mechanized analysis.

Owing to the reduction of costs it is possible to obtain a larger sample for the same expenditure.

Semi-automatic equipment may be converted, during certain hours of the day, to automatic operation.

SECTION 3. — PERIOD DURING WHICH DATA SERVICE OBSERVATION SHOULD BE COLLECTED (BUSY HOURS, SLACK HOURS, BOTH)

The results of all observations taken over the whole day should be recorded in Table 1 under the main heading " Observations spread over the day " (including the busy hours). The results of observations taken during the *four hours* of the day which are considered to be normally the busiest period(s) for the route involved should be recorded additionally under the main heading " Observations limited to four busy hours of the day ".

It is necessary to have the two sets of results of Table 1 to reflect:

— on the one hand, the average quality of service given to subscribers and,

— on the other, the performance of the network during busy periods for assessment of circuits and equipment.

In view of the limited amount of information in Table 2, which can be used for assessment of circuits and equipment, it is not necessary to record separately the results obtained during the busy period(s).

SECTION 4. — OBSERVATION ACCESS POINTS

4.1 Observations for Table 1 should be carried out from access points as close as possible to the international exchange.

The following access points can be considered:

i) outgoing relay set of an international circuit (" exchange " side), i.e. " international circuit access point " [1];

ii) incoming relay set of a national circuit;

iii) link circuits of the international exchange.

If the observations are made at an access point other than on the outgoing international circuit, account will be taken only of calls which have actually caused the international circuit to be seized. Observations will be made only while the call is being set up, and a few seconds after the called subscriber's reply.

When the " circuit access point " [1] is used for observation of international calls it is possible that the service quality of the international exchange may not be checked by either international or national observation programmes.

It is necessary to state in Table 1 the access point where the observations have been made, as observations obtained at each one of the three access points mentioned above are not comparable.

4.2 Observations for Table 2 must be carried out from access points on the operators' positions.

SECTION 5. — NUMBER OF OBSERVATIONS

5.1 Service observing programmes should be established in such a manner that statistical results obtained be as reliable as practicable bearing in mind the cost of obtaining large samples.

5.2 According to the studies carried out by the C.C.I.T.T. in 1964-1968, the quantities shown below are considered the *minimum* quantities to provide a general indication of the quality of service.

5.2.1 *Table 1*

The minimum number of observations per outgoing circuit group for Table 1 should be 200 per month when more than 20 circuits are included in a group, 200 per quarter when there are between 10 and 20 circuits in a group and 200 per year if there are less than 10 circuits in a group.

5.2.2 *Table 2*

The minimum number of observations for Table 2 should be 200 per quarter when there are more than 20 circuits in the group, 200 per semester when there are between 10 and 20 circuits and 200 per year when there are less than 10 circuits in the group.

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[1] For definitions of test access points see Recommendation M.64 (*White Book*, Volume IV). See also Recommendation M.11 (*White Book*, Volume IV).

5.2.3 *Transit traffic*

Where an outgoing circuit group also carries transit traffic it is desirable to obtain data for each destination country reached via this circuit group. In principle, the number of observations for each destination should be obtained as indicated above. To accomplish this, one should use for each destination country its corresponding number of *erlangs* and derive from these *erlangs* a theoretical number of circuits.

However, where only a very small amount of traffic is handled, e.g. less than 5 *erlangs*, each Administration may wish either to make a smaller number of observations or (e.g. in case of no complaints) no observations at all and rely on the information obtained at the transit exchange.

5.3 The number of observations specified above will provide a general indication of results on quality of service in certain broad categories. Administrations * may desire more accurate results, especially for the individual categories in Table 1.

Attention is drawn to Table A, which gives the number of observations required to obtain a certain degree of accuracy.

TABLE A

Expected percentage rate of failure	Number of observations of a random sample required to predict with 95% confidence the true percentage of failure with an accuracy of:					
	±25%	±30%	±35%	±40%	±45%	±50%
2	3136	2178	1600	1225	1030	880
4	1536	1067	784	600	500	440
6	1003	696	512	392	330	290
8	736	511	376	288	245	215
10	576	400	294	225	195	170
12	469	326	239	183	150	132
14	393	273	201	154	128	112
16	336	233	171	131	112	98
18	292	202	149	114	95	80
20	256	178	131	100	85	70
30	149	104	76	60	50	42
40	96	67	50	38	30	24
50	64	44	33	25	20	16

ANNEX TO TABLE A

Examples of use of Table A

1. It is estimated from previous results that a particular type of failure occurs on about 4% of calls. If it is required to confirm, with 95% confidence, that the existing failure rate is between 3% and 5% (i.e. ±25% of 4%), then observations must be made on a random sample of 1536 calls.

* or recognized private operating Agencies.

2. For an expected failure rate of 2%, observations must be made on a random sample of about 1200 calls (1225 in the table) to predict, with 95% of confidence, that the true percentage is between 1.2% and 2.8% (i.e. ±40% of 2%). This means that when 200 observations are taken over a period it is necessary to take the " rolling average " of conditions over six periods. The rate of failure for a number of categories important from the maintenance point of view is expected to be about 2%, e.g. item 3.8 of Table 1 (no tone, no answer).

3. After observations have been taken and the rate of failure in the sample has been calculated, the table may be used in a " backward " direction to give a rough indication of the accuracy of the result.

Suppose that out of a sample of 1000 observations, there were 29 failures due to cause " X " and 15 failures due to cause " Y ". The rates of failure in the sample due to X and Y, respectively, are then 2.9% and 1.5%. From the table, it is apparent from this sample of 1000 calls that the true rate of failure due to X has an accuracy of about ±35% (i.e. is between 1.9% and 3.9%), and that due to Y has an accuracy of about ±50% (i.e. is between 0.8% and 2.3%).

SECTION 6. — EXCHANGE AND ANALYSIS OF THE RESULTS OF OBSERVATIONS

6.1 *Exchange of the results of observations*

The following periodicities are proposed for the exchange of results between Administrations:

Table 1 — a monthly exchange is desirable;

Table 2 — a quarterly exchange is desirable.

Nevertheless, in the case of small groups of circuits (less than 20 circuits) the information should be exchanged after 200 observations have been made but never later than one year in any case; attention is drawn to Table A above, which shows that less than 200 observations are of little value.

Results of observations will be reported without delay:

— to the Administrations * and the I.S.C.C. [1] of the country where observations are carried out,

— to the Administrations * and the I.S.C.C. [1] of the other country (including Transit Administrations and their I.S.C.C. when involved).

The benefits to be derived from service observations tend to decrease with any increase in the time taken to make the results available to those who can take action to bring about an improvement. The results of service observations according to Tables 1 and 2 should therefore be made available to the Administration * in the countries of destination as soon as possible after completion of the observation period and in any case within 6 weeks **.

6.2 *Analysis of observation results*

An analysis of the results should be carried out in the country of origin. However, analysis may also be performed in the country of destination or on a centralized basis [2].

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* or recognized private operating Agencies.

[1] I.S.C.C. = International Service Co-ordination Centre (see Recommendation Q.72).

[2] See new Question 9/XIII: Field trials of centralized processing of service observation results.

Some Administrations have found it useful to distribute to other Administrations concerned service observation statistics in the form of graphs.

RECOMMENDATION E.422 RECOMMENDATION Q.61

OBSERVATION OF INTERNATIONAL OUTGOING TELEPHONE CIRCUITS FOR QUALITY OF SERVICE

(See Table 1)

COMMENTS CONCERNING THE USE OF TABLE 1

a) This table summarizes observations made on outgoing automatic and semi-automatic traffic.

A separate form will be used for each country of destination, and for each group of circuits.

For an explanation of the point of access, see Recommendation E.421 (Q.60*bis*), section 4.1.

Should certain Administrations wish to observe incoming traffic, too, the outcome of such observations could be entered in a similar form [1].

b) These observations should be conducted according to Recommendation Q.60*bis*.

c) One and the same attempt to set up a call will be entered under one category only, namely the most appropriate one. In the case of several faults on one attempt, the most significant cause of failure should be entered.

d) In completing this table, reference should be made to the following explanations:

HOW TO FILL IN TABLE 1

Observations on international outgoing telephone circuits for quality of service

Category

1. Under this category, enter calls successfully put through to a conversation without difficulty. If it is observed that the caller has dialled a wrong number, the call will be entered under 4.1. Category 1 will also include calls put through correctly to operator positions, information services, or to machines replying in place of the subscriber.

2. Enter calls which did not lead to a conversation, provided this fact was not attributable to some equipment failure or to incorrect handling by the caller.

2.1 Calls on which no answer is received after ringing tone has been received for at least 30 seconds.

2.2 Calls which encounter called subscriber busy (see 2.3).

2.3 Every effort should be made to distinguish between the " busy " circumstances under 2.2, 3.1, 3.2 and 3.3.

If no complete distinction between these categories can be made, calls encountering a busy indication will be entered here.

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* or recognized private operating Agencies.

[1] See Question 10/XIII.

TABLE 1

Observation of international outgoing telephone circuits for quality of service

Outgoing international exchange: _____ Point of access: _____

Group of circuits: _____

Service { automatic [a] / semi-automatic [a]

Period from _____

Category	Observations spread over the day (including busy hours)				Observations limited to 4 busy hours per day			
	Number		%		Number		%	
	Sub-total	Total	Sub-total	Total	Sub total	Total	Sub-total	Total
1	2	3	4	5	9	7	8	9
1. Calls [b] successfully put through		...		...		...		...
2. Calls [b] which did not lead to a conversation (but failure not due to equipment or incorrect handling by the caller)		...		...		...		..
2.1 No answer	...		...		...		...	
2.2 Subscribers busy [c]	...		...		...		...	
2.3 Subscribers or routes occupied	...		...		...		...	
3. Unsuccessful calls [b] due to equipment		...		...		...		...
3.1 Congestion at the international transit exchange [c]	...		...		...		...	
3.2 Congestion at the incoming international exchange [c]	...		...		...		...	
3.3 Congestion in the incoming national network [c]	...		...		...		...	
3.4 Wrong number obtained	...		...		...		...	
3.5 Non-reception of answer signal on chargeable calls	...		...		...		...	
3.6 Reception of answer signal when the called party does not reply	...		...		...		...	
3.7 Very poor speech transmission	...		...		...		...	
3.8 No tone, no answer (within 30 seconds) [d]	...		...		...		...	
3.9 Other failures of a technical kind	...		...		...		...	
4. Unsuccessful calls [b] due to incorrect handling by the caller (subscriber or operator)		...		...		...		...
4.1 Wrong number dialled	...		...		...		...	
4.2 Incomplete number	...		...		...		...	
4.3 Call abandoned prematurely (within 30 seconds) before receipt of a tone [d]	...		...		...		...	
4.4 Call abandoned prematurely (within 30 seconds) after receipt of the ringing tone	...		...		...		...	
4.5 Other failures due to incorrect handling	...		...		...		...	
5. Unclassified failures		...		...		...		...
Total calls [b] monitored		...		100		...		100

[a] Delete whatever is inapplicable.
[b] The term "calls" throughout this table refers to circuit seizures by outgoing traffic.
[c] In so far as a distinction is possible; otherwise, 2.3 will apply.
[d] See remark in parentheses at the end of items 3.8 and 4.3 of the explanatory notes.

3. Unsuccessful calls due to equipment.

3.1, 3.2 and 3.3 Calls which encounter congestion (see 2.3).

3.4 Wrong number obtained, although the caller has dialled correctly.

3.5 Calls on which the answer signal has not arrived on the called subscriber's reply, and speech follows. Do not include calls correctly put through, on which the answer signal is not to be sent (for example, the information services in some countries).

3.6 Calls on which an answer signal has been received although the called subscriber has not answered.

3.7 Calls abandoned by the caller because of very poor speech transmission, although the answer signal has been received.

3.8 Calls on which the digital information has been correctly and completely sent, but the caller receives no tone, although he has waited for at least 30 seconds after the sending of the last digit before abandoning the call. (In certain countries post-dialling delay may exceed 30 seconds and this should therefore be taken into account in interpreting the results for this item 3.8).

3.9 This covers failures which cannot be classified under 3.1 to 3.8. It will also cover cases of poor speech transmission detected during the period of observation, even though the call was not abandoned [1].

4. Enter all unsuccessful calls due to incorrect handling by the caller. Calls under this category will be subdivided into:

4.1 Wrong number dialled [2].

4.2 Incomplete number [2].

The observer must as far as possible be aware of the number of digits to be dialled for a successful call. Note that in certain circumstances too long a period between the figures dialled may lead to an anomaly which should be included under this category.

4.3 Prematurely abandoned calls before receipt of a tone. The caller has hung up without awaiting a tone before 30 seconds have elapsed since the last digit of the called number was sent over the international circuit. (In certain countries post-dialling delay may exceed 30 seconds and this should therefore be taken into account in interpreting the results for this item.)

4.4 Call prematurely abandoned after receipt of the ringing tone. The caller has hung up less than 30 seconds after the ringing tone began.

4.5 All cases of incorrect handling by the caller which cannot be entered in 4.1 to 4.4 [1].

5. Enter anomalies which cannot be classified under 2 to 4 [1].

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* or recognized private operating Agency.

[1] The Administration * making the observation should supply all possible information about the failures observed.

[2] This applies only to observations where it is possible to determine that the caller has dialled a wrong or incomplete number.

RECOMMENDATION E.423 RECOMMENDATION Q.62

OBSERVATIONS ON TRAFFIC SET UP BY OPERATORS

(See Table 2 overleaf)

COMMENTS CONCERNING THE USE OF TABLE 2

a) This table summarizes observations relating to manual and semi-automatic outgoing traffic originated by operators. These observations will be made, if possible, during the whole call duration.

b) Administrations * should, if possible, make a distinction between the different types of call, e.g. station-to-station, personal and collect calls; they should use a separate column for each under the heading " Type of call ".

c) For collect calls, the times to be recorded will be those observed in the country where the call request was made.

d) It is recommended that these observations be spread over the whole day.

e) Each outgoing Administration * will select the international circuit groups on which observations should be carried out.

f) In completing this table, reference should be made to the following explanations:

HOW TO FILL IN TABLE 2

Observations on traffic set up by operators

Category

1. This category should show the mean duration of all calls observed which are successful and have been charged for (" effective " calls).

2. This category will show the mean *chargeable* duration of all effective calls observed.

3. This category will show, for each type of observed call, the average time per effective call during which the international circuit has been occupied for manœuvres or for call preparation.

This average should be based on the time during which the international circuit is held:

a) to obtain information concerning the called number;

b) to obtain information about routing and trunk codes;

c) to call operators, in the incoming international exchange;

d) to exchange information on how to set up the call;

e) to (or attempt to) obtain the called number even when it is engaged or does not reply;

f) to (or attempt to) obtain the called person (in personal calls);

g) between replacement of the receiver by the called person and release of the circuit;

h) because the operator is holding the circuit (whether she is on the line or not) and for any other reasons for which the circuit is engaged.

The times listed above, which exclude the conversation time, should be added together. This total should be divided by the number of effective calls observed during the period in question to obtain the value to be entered in Table 2.

* or recognized private operating Agency (or Agencies).

TABLE 2

Observations on traffic set up by operator

International outgoing exchange: _____

Circuit group: _____

Service { semi-automatic [a] / manual [a]

Period from _____ to: _____

Category	Type of call [b]			
	Ordinary	Préavis or personal		
1. Mean call duration—in seconds				
2. Mean chargeable duration—in seconds				
3. Mean holding time of circuits for manœuvres and preparation of calls—in seconds				
4. Number of effective calls observed				
5. Mean number of times the international circuit was seized per effective call				
6. Mean number of " attempts " per effective call				
7. Percentage of calls set up at the first " attempt "				

8. Time-to-answer by operators	Total number of calls answered and unanswered		Calls answered						Calls unanswered (abandoned calls)			
	Number	Mean waiting time in seconds	under 15 seconds		in 15 to 30 seconds		after 30 seconds		within 30 seconds		after 30 seconds	
Operators:			No.	%	No.	%	No.	%	No.	%	No.	%
— incoming operator (code 11)												
— delay operator (code 12)												
— assistance operator												
— information operator												

9. Quality of transmission from the subscriber's viewpoint:	Number	%	10. Comments
— good			
— defective			
Total		100	

a Delete whichever is inapplicable.
b In accordance with b) under remarks.

4. The number of effective calls observed considered in category 1.

5. The mean number of times the international circuit was seized per effective call (see category 3). This number is usually obtained by meter recordings.

6. The mean number of " attempts " (as specifically defined hereafter from the operating point of view) to set up a call. Should the operator try several times to set up a call while continuously occupied on that call, all these operations must be considered as being one attempt. Similarly, if the operator makes several tries to set up a call and each time encounters a congestion or busy condition and if, after the last try, she informs the caller, only one attempt must be entered. Calls to information services or to obtain routing particulars, and all calls not directly related to the establishment of a call or to information required by the caller, should not be considered as attempts and should not be included.

The total number of attempts during the period of observation should be divided by the number of effective calls observed in the same period to obtain the mean number of attempts per call.

The total number of attempts is usually determined from markings or notations on call tickets.

7. The data for this category will be taken from all tickets prepared for the relation concerned, during the period of observation or a comparable period.

8. The mean waiting time for outgoing operators to receive an answer will be indicated in seconds. This average will include both answered and unanswered calls.

An outgoing operator waits on the circuit (waiting time) for the period:

a) until the incoming operator answers, or

b) until she abandons the attempt, should the incoming operator not answer.

Thus while mean waiting time relates to the outgoing operator it is also a measure of the performance of the incoming operators.

9. It will be difficult to obtain absolutely comparable results from all observers for this category. However, the observer should consider the quality of transmission from the subscribers' viewpoint, taking into account comments made in this respect by subscribers and the number of requests for conversation to be repeated.

10. This category should include any comments likely to explain the probable cause of difficulties frequently noted during the observations.

RECOMMENDATION E.424 RECOMMENDATION Q.63

TEST CALLS

1. *General*

Test calls carried out manually or automatically to assess the functioning of international circuits or connections are of three types:

a) *Type 1 test call*

A test call conducted between two directly connected international centres to verify that the transmission and signalling on an international circuit of a given group are satisfactory.

b) *Type 2 test call*

A test call conducted between two international centres not directly connected to verify transit operational facilities of an intermediate international centre.

c) *Type 3 test call*

A test call from an international centre to a subscriber type number in the national network of the distant country, generally as a result of a particular kind of fault.

Types 1, 2 and 3 test calls must not interfere with customer traffic. If, however, test calls contributing a significant load on a part of a network are to be made, prior advice should be given to the other Administration(s)* concerned. Types 1 and 2 test calls for preventive maintenance should be conducted during light load periods. Types 1 and 2 test calls should be conducted as and when required for the investigation and clearance of faults.

Type 3 test calls should be conducted only after adequate testing has been done by means of type 1 or 2 test calls and after the distant Administration * has made the necessary check in its national network. Type 3 test calls should be conducted during light load period.

In order to find faults in last-choice equipment, it may be necessary for tests to be carried out at the time when the traffic load approaches the full capacity of the route under test. The agreement of the distant I.S.C.C. will be necessary before this test is carried out.

Note. — Subscriber-to-subscriber type test calls are being studied by the C.C.I.T.T. in 1968-1972 under Question 11/XIII.

2. *Results of test calls*

(See Table 3 overleaf)

COMMENTS CONCERNING THE USE OF TABLE 3

a) Table 3 summarizes tests carried out manually or automatically to assess the functioning of the international circuit or connection.

b) It is essential to indicate clearly the way in which the tests have been carried out and to give full information about the testing apparatus used.

c) Administrations * may insert additional categories in Table 3 as they see fit.

* or recognized private operating Agency (or Agencies).

TABLE 3

Results of test calls

International outgoing exchange: _____

Circuit group: _____

Service { semi-automatic [a] / automatic [a] }

Type of test call:
Type 1 [a]
Type 2 [a]
Type 3 [a]

Period from: _____ to: _____

Category	Number		%	
	Sub-total	Total	Sub-total	Total
1. Satisfactory tests		...		...
2. Signalling and charging faults		...		...
2.1 Wrong number	...		...	
2.2 No tone, no answer	...		...	
2.3 Absence of a backward line signal	...		...	
2.4 Other faults	...		...	
3. Transmission faults		...		...
3.1 Conversation impossible	...		...	
3.2 Call overamplified or underamplified	...		...	
3.3 Noise	...		...	
3.4 Fading	...		...	
3.5 Crosstalk	...		...	
4. Congestion		...		...
5. Other faults		...		...
	...		...	
	...		...	
	...		...	
Tests carried out		...		100

Test procedure followed (apparatus used, destination of calls, etc.)

[a] Delete whichever is inapplicable.

Volume II-A **Volume VI**

PART V PART VI

TRAFFIC ENGINEERING

CHAPTER I

MEASUREMENT AND RECORDING OF TRAFFIC

RECOMMENDATION E.500 RECOMMENDATION Q.80

MEASUREMENT OF TRAFFIC FLOW [1]

1. Traffic statistics should be measured for the significant period of each day of the whole year by automatic measuring and recording equipment capable of running continuously.

The recording equipment should make a record of the *traffic flow* carried during the *mean busy hour* for at least the 30 days (not necessarily consecutive) of the previous 12 months in which the mean busy-hour traffic flow is the highest. The record should also include the date of such measurements. This method gives traffic information of relatively high accuracy. This method is suitable for circuit groups operated automatically or semi-automatically.

Note. — The traffic flow for the busiest days having been recorded in this way, processing means can be employed to calculate values for the average traffic flow for the 30 and for the 5 busiest days during periods of 12 consecutive months. Such pairs of values can be calculated for a period of 12 months terminating in December and/or periods of 12 months terminating at other times.

It is recommended that the minimum requirement is an annual series of values terminating at the same time each year.

2. A second method which yields information of a lower degree of accuracy may be used by Administrations * until they are ready to use the first, which is the preferred method. However, under certain circumstances, for manually operated groups of circuits, the second method is the only one possible.

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* or recognized private operating Agencies.

[1] See the definitions of the terms used in the Annex to Part VI (for Volume VI only).

This second method comprises a measuring period of 10 consecutive normal working days during the busiest season of the year. In the determination of the busiest season of the year it is necessary to bear in mind that a pronounced annual growth may cause a busy season at the end of the year to appear to exceed the busiest season which occurred earlier in the year. Since in most cases the busiest season is not clearly defined and varies from year to year, this method may be improved by taking a consecutive 10-day sample from the results of measurements made over a much longer period, for example 13 weeks covering the busy season(s). This extended period of measurement should provide information about the exceptionally busy days.

3. *Notification of mean busy hour traffic*

Measurements of the mean busy hour traffic, expressed in erlangs and quoting the busy hour on a G.M.T. basis, also the date of measurement or the period for which the estimate is valid, should be communicated to other Administrations* concerned in the handling of the traffic.

RECOMMENDATION E.501 RECOMMENDATION Q.81

AUTOMATIC TRAFFIC-RECORDING DEVICES

Greater use should be made of automatic methods of recording and analysing traffic data because it would appear inevitable that more information regarding the traffic will be required as the continental and intercontinental networks are expanded. Therefore automatic methods, in addition to being more efficient, may well be the only economical ones to use. It is emphasized that, whilst any automatic equipment should not be unduly complicated, it should nevertheless be able to provide output information in a form which will be readily acceptable to an automatic data-processing system.

Attention of Administrations* is drawn to the following features given in the Annex for the design of traffic-recording machines; these features cover arrangements which might be made and facilities which might be incorporated.

ANNEX
(to Recommendation E.501 and Q.81)

Features for automatic traffic-recording machines

1. *Basic automatic traffic-recording equipment*

1.1 *Purposes*

The equipment is primarily intended for ordinary traffic-engineering purposes, i.e. to collect the traffic data which are generally desired for the continuous supervision of a network and its long-term planning.

* or recognized private operating Agencies.

It is the main purpose of the equipment that measurements may be made, sometimes over extended periods, with the minimum of maintenance attention. In consequence, it is envisaged that each measurement will be provided as the result of instructions given to the machine in advance. The results of such measurements should be printed out or recorded on tape. A typical instruction would be to measure the traffic on a group of circuits between, say, 10 a.m. and 11 a.m. and to connect an output circuit at 11 a.m. which would print out and/or record the results on a tape.

1.2 *Measurement period*

It is required that the traffic-recording equipment should be capable of making traffic comparisons either for a single busy hour or for a number of periods during a day.

Until the traffic characteristics of a group of circuits have been established it will be desirable to make daily measurements throughout the year. Such measurements will indicate the busy seasons and the distribution of the busy days. It is recognized that many of the measurements relating to slack days have no lasting value and it is therefore advantageous to consider whether the traffic-recording equipment cannot be designed with facilities such that the output is inhibited for those days on which the traffic does not exceed some predetermined minimum. As each group would need to have its own predetermined value, the machine would need to have means for storing the reference value for each group.

1.3 *Traffic data necessary to plan for a specified grade of service*

The amount of information necessary for planning will not be identical for all groups of circuits and for all relations [1], as some groups of circuits will provide for several relations whereas the traffic for some relations may be divided between different routes. It is desirable that the traffic machine should be designed to measure:

a) carried traffic flow;

b) number of call attempts (including repeated attempts and call attempts not gaining access to a group of international circuits);

c) duration of the periods during which no circuits are available;

d) number of call attempts experiencing congestion.

It is intended that the holding time when needed could be deduced from items a) and b). For groups with an adequate number of circuits any measurements under c) and d) are likely to be of little value.

As congestion increases, the b), c) and d) measurements become much more important for the following reasons:

i) Measurements of carried traffic will not include calls experiencing congestion. Repeated attempts may result from such calls.

ii) Circuits blocked by the maintenance staff may lead to much more serious congestion than might be expected from the carried-traffic flow.

iii) Although the number of calls experiencing congestion, d), provide more information than the congestion-time measurements, c), complications arise in the case of both-way circuits because the d) measurements have to take place in both terminations, and this may result in delay in obtaining access to the full statistics.

[1] The word "relations" is used to describe the traffic from one particular country to another particular country.

1.4 *Traffic measurements for different groups of circuits*

1.4.1 The traffic-recording machine is required particularly to collect carried-traffic statistics as defined in Recommendation E.500 and Q.80. As a general rule, carried-traffic measurements will refer to the whole of a group of circuits between two centres. Such circuits may carry one-way or both-way traffic.

1.4.2 Measurement of traffic for particular relations (e.g. between two different countries):

1.4.2.1 *Direct (point-to-point) circuits*

In some cases the traffic for a particular relation will use an independent group of direct circuits (without overflow facilities) and the traffic measurement should be made according to section 1.3.

1.4.2.2 *High-usage and final routes*

Some relations will be served by direct high-usage circuits and by overflow facilities. In such cases the direct high-usage group of circuits can be measured according to section 1.3. Such measurements provide only an indication of the traffic flow because the day-to-day fluctuations will be more apparent on the overflow than on the high-usage group.

The arrangement described in the following section 3 indicates means whereby more detailed information can be collected. It should be observed that holding-time statistics are available on the high-usage group, and the traffic machine should be capable of measuring these values directly or by measuring the traffic flow and the corresponding number of calls.

1.4.2.3 *No direct or high-usage circuits*

The traffic for many relations may be combined and switched through a transit centre; in such cases the normal form of measurement cannot provide complete information and reference needs to be made to registers or markers which are aware of call destinations. The C.C.I.T.T. signalling systems do not provide facilities to enable transit or incoming calls to be identified according to their country of origin and, therefore, it is possible to make measurements only at the outgoing international exchange. Such measurements should indicate the number of offered calls and the number of calls experiencing congestion. These measurements will not indicate holding time and it does not seem justified to complicate the equipment in order to allow such measurement to be made. It is thought to be sufficient to provide facilities to measure the mean holding time on each group of circuits serving a number of relations. A check can be made of the holding time for any relation by reference to the statistics collected for international accounting. (See Recommendation E.280 and Q.50.)

It is expected that traffic measurements for particular relations can be taken on a non-continuous basis and that it will be unnecessary to provide facilities for measuring many relations simultaneously. Nevertheless, it must be recognized that the determination of the busy season for a relation may not be easy if the traffic for several relations uses the same group of circuits. Full traffic statistics for a relation can always be measured in special cases by routing the traffic through an additional switching stage at the outgoing centre so that independent measurements can be made.

In many cases the need for information about relations with a small amount of traffic will be limited to ascertaining the advisability of introducing high-usage (direct) circuits. This situation will become evident from statistics for international accounting.

1.5 *Indication of traffic congestion*

A traffic machine which runs continuously has the valuable asset of being able to indicate abnormal congestion quickly.

As a consequence it is recommended that, besides measuring traffic carried on a group of circuits, the machine should be able to recognize when there is congestion and indicate this fact so that immediate action can be taken.

1.6 *Indication of results*

In order that statistics may be collected in respect to both outgoing and incoming calls, and in order to keep the measuring equipment as flexible as possible, the indications to the measuring equipment from the circuits under measurement should be given in the same way for both types of call.

In applications in which it is desired to separate the semi-automatic and automatic call statistics separate indications must be given by the circuits to the measuring equipment.

Facilities should be provided for simultaneous measurement of the four traffic characteristics listed in section 1.3 on any specified group of circuits. It should be possible to give varying instructions to the machine indicating when to make measurements. The individual results should be printed out or recorded on tape.

It should be possible to make measurements on a specified number of routes. As a general rule, traffic carried and congestion time will always be referred to the whole of the circuit group, while the total number of calls and the number of calls experiencing congestion may also be referred to one of several relations served by a circuit group or to a relation served by a number of routes.

The indications for the traffic characteristics in section 1.3 may be given from the individual circuit equipments and/or from common equipment such as markers or registers. It is desirable that the indications follow a given standard.

The number of groups of circuits for which simultaneous measurements are required should be specified separately.

1.7 *Examples of measurements which may be provided by the automatic measuring equipment*

Examples of measurements that may be desired are shown below in section 1.8. In order to indicate the importance these different measurements may be expected to have, the different items have been given the signs I or II having the following meanings:

(I) Measurements expected to be made on all routes for supervision of the network, including its long-term planning.

(II) Measurements expected to be made occasionally on a few routes at the same time, provided that the inclusion of the facilities does not noticeably increase the cost of the equipment.

1.8 *Facilities*

1.8.1. Facilities should be provided for measuring the carried traffic flow for a group for any specified period (I).

1.8.2. Facilities should be provided for measuring the congestion time and/or the number of calls experiencing a congestion condition. It is required that the equipment should allow measurement totals to be made available daily on either a busy-hour, a 2-hour or a 24-hour basis. Facilities should be provided for giving an alarm if the congestion exceeds a specified limit (I).

1.8.3 Facilities should be provided for measuring and for printing out or recording on tape the total traffic carried during each 15-minute period, so that the mean busy hour may be determined (I).

Note. — As an example, the facilities can be provided by causing the machine to produce an output total at 15-minute intervals from any starting hour to any finishing hour.

1.8.4 Facilities should be provided for measuring both the traffic and the number of call attempts and for printing out or recording on tape the totals for a specified hour or for 24 hours (II).

Note. — The results can be used for the calculation of holding times.

1.8.5 Facilities should be provided for counting call attempts in common circuits (such as registers, markers, etc.) for the following purposes:

i) to identify the sample busy hour by periodically printing out or recording on tape the totals as in 1.8.3 (II).

ii) to determine the number of call attempts to a specified country during the sample busy hour (I).

iii) to determine the number of call attempts switched over a direct route to a specified country (I or II).

iv) to determine the number of call attempts switched over one or more overflow routes to a specified country (I or II).

v) to determine the number of call attempts to a specified country which are ineffective due to equipment or signalling failures. Such failures might upset the accuracy of traffic measurement in a similar way to congestion (I or II).

vi) to determine the number of call attempts to a specified country which are ineffective due to all direct and overflow circuits being in use (I).

vii) to determine the number of operator-handled call attempts on a given route (II).

viii) to determine the number of subscriber-dialled call attempts on a given route (II).

1.9 *Control*

It is intended that in principle the recording equipment should be operated in response to processed instructions, for example a message on tape. It is desirable that the arrangement should be of such a form that remote control can easily be arranged.

2. *Supplementary traffic-recording equipment*

2.1 *Purpose*

The equipment is primarily intended for ordinary traffic-engineering purposes, i.e. to collect the traffic data which are generally desired for the continuous supervision of a network and its long-term planning.

Whereas the features listed in section 1 are generally needed for this equipment also, there is a basic difference. For the supplementary equipment a typical instruction will be to measure whether the traffic characteristics on a group of circuits between, say, 10 a.m. and 11 a.m. exceeds a predetermined value. If there should be an excess, it is required that an output equipment should be connected at 11 a.m. and that this equipment shall then print out and/or record the resulting information.

2.2 *Traffic characteristics to be recorded*

These requirements are similar to those in section 1 but differ because an average traffic-flow value is not required for every sample period but the value should be passed to output equipment when it exceeds a predetermined figure.

2.3 *Output-recording equipment*

This equipment forms the subject of section 3. If a common output is used, then the route must be recorded. It is sufficient to insert the date only once per day.

2.4 *Measurement period*

Traffic-recording equipment should be capable of making traffic comparisons either for a single busy hour or for a number of periods during a day.

3. *Central analysing equipment*

3.1 Central analysing equipment is required to examine the traffic records which have been accumulated. It is assumed that the necessary measurement statistics have been recorded on some medium which can be read by machine (e.g. paper tape).

For these purposes it is desirable that the analysing equipment should be capable of identifying the busiest season, the traffic flow at the busiest season, the annual growth of the traffic flow, and the extent to which the busiest season exceeds other seasons.

Furthermore the equipment should be capable of receiving data in respect to both the present number of circuits in operation and the dates on which it is planned that the present facilities will be extended. With this information it should be possible for the machine to estimate when the amount of disturbed traffic may be expected to exceed a specified grade of service.

3.2 It is expected that, in addition to the analysis which will be needed when planning an extension period, reviews will be advisable to check the rate of growth; such checks may be satisfied by extracting the busiest season and the mean busy-hour traffic for the 5 and 30 highest days. For a more complete analysis it would be interesting to extract such averages for each month and to establish any relationship between these averages.

It may prove to be more economical to design the recording equipment to record all days during which the busy-hour traffic exceeds some predetermined value than to design it to ascertain, as a continuous process, which are the 30 highest days. In either case the recording equipment must measure the busy-hour traffic each day, and it is likely to be simpler to make a record of all days which exceed a predetermined value than to have to ascertain whether the value for a particular day will be needed or not.

CHAPTER II

DETERMINATION OF THE NUMBER OF CIRCUITS IN MANUAL OPERATION

RECOMMENDATION E.510 [1] RECOMMENDATION Q.85

DETERMINATION OF THE NUMBER OF CIRCUITS IN MANUAL OPERATION

1. The quality of an international manual demand service should be defined as the percentage of call requests which, during the average busy hour (as defined later under 3), cannot be satisfied immediately because no circuit is free in the relation considered.

By "call requests satisfied immediately" are meant those for which the call is established by the same operator who received the call, and within a period of two minutes from receipt of that call, whether the operator (when she does not immediately find a free circuit) continues observation of the group of circuits, or whether she makes several attempts in the course of this period.

Ultimately, it will be desirable to evolve a corresponding definition based on the " average speed " of establishing calls in the busy hour, that is to say the average time which elapses between the moment when the operator has completed the recording of the call request and the moment when the called subscriber is on the line, or the caller receives the advice " subscriber engaged ", " no reply ", etc. But for the moment, in the absence of information about the operating time in the European international service, such a definition cannot be established.

2. The number of circuits it is necessary to allocate to an international relation, in order to obtain a given grade of service, should be determined as a function of the " total holding time " of the group in the busy hour.

The total holding time [2] is the product of the number of calls in the busy hour and a factor which is the sum of the average call duration and the average operating time.

These durations will be obtained by means of a large number of observations made during the busy hours, by agreement between the Administrations * concerned. If necessary, the particulars entered on the tickets could also serve to determine the average duration of the calls.

The average call duration will be obtained by dividing the total number of minutes of conversation recorded by the recorded number of effective calls.

The average operating time will be obtained by dividing the total number of minutes given to operating (including ineffective calls) by the number of effective calls recorded.

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* or recognized private operating Agencies.

[1] This Recommendation dates from the XIIIth Plenary Assembly of the C.C.I.F. (London, 1946) and has not been fundamentally revised since. It will be studied under Question 13/II in the 1969-1972 C.C.I.T.T. study period.

[2] It should be noted that the determination of the total holding time in this Recommendation is not consistent with the measurement of traffic flow as described in Recommendation Q.50.

3. The number of calls in the busy hour will be determined from the average of returns taken during the busy hours on a certain number of busy days in the year.

Exceptionally busy days, such as those which occur around certain holidays, etc., will be eliminated from these returns. The Administrations * concerned should plan, whenever possible, to put additional circuits into service for these days.

In principle, these returns will be taken during the working days of two consecutive weeks, or during ten consecutive working days. If the monthly traffic curve shows only small variations, they will be repeated twice a year only. They will be taken three or four times a year or more if there are material seasonal variations, so that the average established is in accordance with all the characteristic periods of traffic flow.

4. The total occupied time thus determined should be increased by a certain amount determined by agreement between the Administrations * concerned according to the statistics of traffic growth during earlier years, to take account of the probable growth in traffic and the fact that putting new circuits into service takes place some time after they are first found to be necessary.

5. The total holding time of the circuits thus obtained, in conjunction with a suitable table (see below), will enable the required number of circuits to be ascertained.

6. In the international manual telephone service, the following Tables A and B should be used as a basis of minimum allocation:

Table A corresponds to about 30% of calls failing at the first attempt because of all circuits being engaged and to about 20% of the calls being deferred.

Table B, corresponding to about 7% of calls deferred, will be used whenever possible.

These tables do not take account of the fact that the possibility of using secondary routes permits, particularly for small groups, an increase in the permissible occupation time.

* or recognized private operating Agencies.

Capacity tables of circuit groups

Number of circuits	Table A		Table B	
	Percentage of circuit usage	Minutes of circuit usage possible in the busy hour	Percentage of circuit usage	Minutes of circuit usage possible in the busy hour
1	65.0	39	—	—
2	76.7	92	46.6	56
3	83.3	150	56.7	102
4	86.7	208	63.3	152
5	88.6	266	68.3	205
6	90.0	324	72.0	259
7	91.0	382	74.5	313
8	91.7	440	76.5	367
9	92.2	498	78.0	421
10	92.6	556	79.2	475
11	93.0	614	80.1	529
12	93.4	672	81.0	583
13	93.6	730	81.7	637
14	93.9	788	82.3	691
15	94.1	846	82.8	745
16	94.2	904	83.2	799
17	94.3	962	83.6	853
18	94.4	1020	83.9	907
19	94.5	1078	84.2	961
20	94.6	1136	84.6	1015

Remark. — Tables A and B can be extended for groups comprising more than 20 circuits by using the values given for 20 circuits.

CHAPTER III

DETERMINATION OF THE NUMBER OF CIRCUITS IN AUTOMATIC AND SEMI-AUTOMATIC OPERATION

RECOMMENDATION E.520 RECOMMENDATION Q.87

NUMBER OF CIRCUITS TO BE PROVIDED IN AUTOMATIC AND/OR SEMI-AUTOMATIC OPERATION, WITHOUT OVERFLOW FACILITIES

This Recommendation refers to groups of circuits used:

— in automatic operation;
— in semi-automatic operation;
— in both automatic and semi-automatic operations on the same group of circuits.

1. *General method*

1.1 The C.C.I.T.T. recommends that the number of circuits needed for a group should be read from tables or curves based on the classical Erlang B formula (see *White Book*, Volume VI, Documentary part, Supplements No. 8 and No. 9), which refers to full availability groups. Recommended methods for traffic determination are indicated in Recommendation E.500 and Q.80.

For *semi-automatic operation* the loss probability p should be based on 3% during the mean busy hour.

For *automatic operation* the loss probability p should be based on 1% during the mean busy hour.

Semi-automatic traffic using the same circuits as automatic traffic is to be added to the automatic traffic and the same parameter value of $p = 1\%$ should be used for the total traffic.

The values of 3% and 1% quoted above refer to the Erlang B formula and derived tables and curves. The 3% value should not be considered as determining a grade of service because with semi-automatic operation there will be some smoothing of the traffic peaks; it is quoted here only to determine the value of the parameter p (loss probability) to use in the Erlang B tables and curves.

1.2 In order to provide a satisfactory grade of service both for the mean busy-hour traffic and for the traffic on exceptionally busy days, it is recommended that the proposed number of circuits should, if necessary, be increased to ensure that the loss probability shall not exceed 7% during the mean busy hour for the average traffic estimated for *the five busiest days* as specified in Recommendation E.500 (Q.80).

1.3 For *small groups of long intercontinental circuits* with automatic operation some relaxation could be made in respect to loss probability. It is envisaged that such circuits would be operated on a both-way basis and that a reasonable minimum for automatic service would be a group of six circuits. A table providing relaxation is annexed to this Recommendation and is based on a loss probability of 3% for six circuits, with a smooth progression to 1% for 20 circuits. The general provision for exceptional days remains unchanged.

For exceptional circumstances in which very small groups (less than six intercontinental circuits) are used for automatic operation, dimensioning of the group should be based on the loss probability of 3%.

2. *Time differences*

Time differences at the two terminations of intercontinental circuits are likely to be much more pronounced than those on continental circuits. In order to allow for differences on groups containing both-way circuits it will be desirable to acquire information in respect to traffic flow both during the mean busy hour for both directions and during the mean busy hour for each direction.

It is possible that in some cases overflow traffic can be accepted without any necessity to increase the number of circuits, in spite of the fact that this overflow traffic is of a peaky nature. Such circumstances may arise if there is no traffic overflowing from high-usage groups during the mean busy hour of the final group.

3. *Both-way circuits*

3.1 With the use of both-way circuits there is a danger of simultaneous seizure at both ends; this is particularly the case on circuits with a long propagation time. It is advisable to arrange the sequence of selection at the two ends so that such double seizure can only occur when a single circuit remains free.

When all the circuits of a group are operated on a both-way basis, time differences in the directional mean busy hours may result in a total mean busy hour traffic flow for the group which is not the sum of the mean busy hour traffic loads in each direction. Furthermore, such differences in directional mean busy hour may vary with seasons of the year. However, the available methods of traffic measurement can determine the traffic flow during mean busy hour for this total traffic.

5.2 Some intercontinental groups may include one-way as well as both-way operated circuits. It is recommended that in all cases the one-way circuits should be used, when free, in preference to the both-way circuits. The number of circuits to be provided will depend upon the one-way and total traffic.

The total traffic will need to be determined for:

a) each direction of traffic;

b) both-way traffic.

This determination is to be made for the busy hour or the busy hours corresponding to the two cases a) and b) above.

In the cases where the number of one-way circuits is approximately equal for each direction, no special procedure is necessary, and the calculation can be treated as for a simple two-group grading [1].

If the number of one-way circuits is quite different for the two directions, some correction may be needed for the difference in randomness of the flow of calls from the two one-way circuit groups to the both-way circuit group. The general techniques for handling cases of this type are quoted in Recommendation E.521 (Q.88).

ANNEX
(to Recommendation E.520 (Q.87))

The following table may be applied to small groups of long intercontinental circuits. The values in column 2 are suitable for a random offered traffic with full availability access.

Number of circuits	Traffic flow (in erlangs)		
	Offered	Carried	Encountering congestion
(1)	(2)	(3)	(4)
6	2.54	2.47	0.08
7	3.13	3.05	0.09
8	3.73	3.65	0.09
9	4.35	4.26	0.09
10	4.99	4.90	0.09
11	5.64	5.55	0.10
12	6.31	6.21	0.10
13	6.99	6.88	0.10
14	7.67	7.57	0.10
15	8.37	8.27	0.11
16	9.08	8.96	0.11
17	9.81	9.69	0.11
18	10.54	10.42	0.11
19	11.28	11.16	0.12
20	12.03	11.91	0.12

The table is based on 1% loss probability for 20 circuits and increases progressively to a loss probability of 2% at 9 circuits and 3% at 6 circuits (loss probabilities for these three values being based on the Erlang loss formula: see Supplement No. 8 to Volume VI or Supplement No. 1 in Volume II-A). The traffic flow values obtained from a smoothing curve coincide very nearly with those determined by equal marginal utility theory, i.e. an improvement factor of 0.05 erlang for an additional circuit.

[1] See article by I. TÅNGE: " Optimal use of both-way circuits in cases of unlimited availability ", *TELE*, English Edition No. 1, 1956.

For groups requiring more than 20 circuits the table quoted in Recommendation E.520 (Q.87) for loss probability of 1% should be used (see Supplement No. 8 to Volume VI or Supplement No. 1 in Volume II-A).

RECOMMENDATION E.521 — RECOMMENDATION Q.88

CALCULATION OF THE NUMBER OF CIRCUITS IN A GROUP CARRYING OVERFLOW TRAFFIC

A calculation of the number of circuits in groups carrying overflow traffic should be based on this Recommendation and Recommendation E.522 (Q.89) dealing with high-usage circuits. An annex to this Recommendation describes two simplified methods with appropriate examples. These two methods should give substantially the same results.

A still simpler method for determining the number of circuits required on overflow systems could be based on increasing the overflow traffic values by 2% to 4% and then using Recommendation E.520 (Q.87).

Yet another method consists in applying a modified traffic table which gives the number of final circuits increased by 7% compared with the Erlang loss formula. This procedure may result in considerable over-provision of circuits but it compensates for traffic under-estimates and provides safeguards for traffic surges [1].

ANNEX
(to Recommendation E.521 (Q.88)

Simplified methods of determining the number of circuits in a group carrying overflow traffic

The following two methods are applicable when *computational* facilities are limited and an approximate value for the number of circuits is sufficient:

Method 1 — Simplified weighted choice method

Method 2 — Maximum variance method

Method 1 — Simplified weighted choice method

The peakedness of the constituent parts of the overflow traffic is described by the *choice factor*, e.g. 0.41 erlangs, overflowing from 12 circuits is described as 0.41 × 13, i.e. 0.41 erlangs offered to a 13th choice circuit. The sum of the products of these two values (i.e. 0.41 × 13 in the above example) for each constituent part is divided by the total of the overflow traffic to obtain a weighted description of the overflow traffic.

The number of circuits required for 1% congestion is obtained by taking the total traffic offered and the weighted choice and then reading the number of circuits from Table 4.

An illustration of the use of this method is given in Table 1 below:

[1] See " Processing by computers for network planning and design " by Kenzo FUKUI; *N.T.T.* Technical Publication D—No. 8 and *J.T.R.* 1967, Volume 9, No. 4.

TABLE 1

Example of the determination of the weighted choice

Constituent parts (1)	Traffic offered to the overflow group of circuits and choice factor (2)	Choice × erlangs (3)
a	0.41 × 13	5.33
b	0.16 × 3	0.48
c	0.42 × 4	1.68
d	0.51 × 7	3.57
e	0.35 × 3	1.05
f	0.69 × 8	5.52
g	0.50 × 2	1.00
h	2.95 × 7	20.65
	approx. 6	approx. 40

Therefore the weighted choice is $\frac{40}{6} = 7$ and the number of circuits is 15.

Notes. — Column (2) is determined from overflow tables or curves, column (3) is product of the two values in column (2).

The first column " constituent parts " may include a traffic parcel which is not overflow traffic; for such an item the entry in column (2) should be $A \times 1$ where A is the offered traffic value and 1 indicates that the traffic is offered to the overflow group as a first choice item of traffic.

Method 2 — Maximum variance method

The overflow traffic is described by two parameters, the mean value, β, and a " peakedness factor ", z.

The peakedness factor indicates the degree to which the variability of the calls deviates from pure chance traffic, and in statistical terms is the variance-to-mean ratio of the distribution of simultaneous overflow calls.

The mean overflow traffic, β, from a high-usage group is found by employing the standard Erlang loss formula $E_1\, n\,(A)$

$$\beta = A \cdot E_1, n\,(A)$$

where A is the offered load in erlangs to n high-usage circuits.

Peakedness factors of overflow traffic depend principally upon the number of circuits over which random traffic has limited access. In most practical cases, the actual peakedness of the traffic overflowing from a high-usage group will be only slightly below the maximum peakedness values [1,2]. The maximum peakedness values are given in Table 2 and are assumed to be sufficiently accurate for use with this method.

[1] Tables giving:

— the exact mean of the overflow traffic and

— the difference between variance and mean of the overflow traffic have been computed and are set out in " Tabellen für die Planung von Fernsprecheinrichtungen, Siemens u. Halske, München 1961 ".

[2] Curves giving the exact mean and variance of overflow traffic are given in Figures 12 and 13 of " Theories for Toll Traffic Engineering in the U.S.A. ", by R. I. WILKINSON, *Bell System Technical Journal*, Volume 35, March 1956. See also by the same author a more detailed description of the method in " Simplified Engineering of Single Stage Alternate Routing Systems ", Fourth International Teletraffic Congress, London, 1964.

TABLE 2

Maximum peakedness factors, z

Number of circuits (n)	Peakedness factor (z)	Number of circuits (n)	Peakedness factor (z)
1	1.17	16	2.44
2	1.31	17	2.49
3	1.43	18	2.55
4	1.54	19	2.61
5	1.64	20	2.66
6	1.73	21	2.71
7	1.82	22	2.76
8	1.90	23	2.81
9	1.98	24	2.86
10	2.05	25	2.91
11	2.12	26	2.96
12	2.19	27	3.00
13	2.26	28	3.05
14	2.32	29	3.09
15	2.38	30	3.14

The weighted mean peakedness factor, z, is then calculated from

$$z = \frac{\sum_{i=1}^{h} \beta_i z_i}{\sum_{i=1}^{h} \beta_i}$$

for the h parcels of traffic being offered to the final circuits. As an example, the calculations for the weighted mean peakedness factor are as shown in Table 3 below for the case of the parcels of traffic quoted in Table 1.

The number of circuits required is then determined from Table 5 using the column heading nearest to the weighted peakedness factor, z. In the example above it is found that the overflow load of 5.99 erlangs can be served at a loss probability $p = 1\%$ by 15 circuits.

TABLE 3

Example of the determination of the weighted mean peakedness factor

High-usage group number	Traffic offered to HU group	Number of HU circuits	Mean value of overflow traffic β	Peakedness factor z	$z \times \beta$
(1)	(2)	(3)	(4)	(5)	(6) = (4) × (5)
a	8.0	12	0.41	2.19	0.90
b	0.9	2	0.16	1.31	0.21
c	2.0	3	0.42	1.43	0.60
d	4.1	6	0.51	1.73	0.88
e	1.3	2	0.35	1.31	0.46
f	5.2	7	0.69	1.82	1.26
g	1.0	1	0.50	1.17	0.59
h	7.8	6	2.95	1.73	5.10
Totals	30.3		5.99		10.00

The weighted mean peakedness factor is therefore $= \frac{10.00}{5.99} = 1.67$

TABLE 4

Number of circuits for a loss probability p = *0.01, for overflow traffic, using the simplified weighted choice method*

Required number of circuits	Weighted choice											
	1.0	1.5	2.0	2.5	3.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0
	Overflow traffic in erlangs											
1	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.15	0.05	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.46	0.35	0.24	0.13	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.87	0.75	0.62	0.53	0.4	0.23	0.0	0.0	0.0	0.0	0.0	0.0
5	1.36	1.23	1.11	0.99	0.88	0.67	0.33	0.0	0.0	0.0	0.0	0.0
6	1.91	1.77	1.64	1.52	1.39	1.18	0.82	0.51	0.20	0.0	0.0	0.0
7	2.50	2.35	2.13	2.09	1.96	1.72	1.34	1.02	0.74	0.47	0.14	0.0
8	3.13	2.97	2.83	2.69	2.56	2.30	1.90	1.58	1.28	1.02	0.76	0.52
9	3.78	3.61	3.46	3.32	3.20	2.91	2.50	2.14	1.84	1.57	1.32	1.08
10	4.46	4.29	4.13	3.98	3.85	3.55	3.11	2.75	2.43	2.15	1.89	1.65
11	5.16	4.98	4.81	4.66	4.52	4.21	3.75	3.37	3.04	2.75	2.48	2.24
12	5.88	5.69	5.51	5.34	5.21	4.89	4.40	4.01	3.67	3.36	3.09	2.84
13	6.61	6.41	6.22	6.05	5.91	5.58	5.08	4.68	4.32	4.00	3.72	3.46
14	7.35	7.15	6.96	6.78	6.64	6.29	5.77	5.34	4.98	4.66	4.36	4.09
15	8.11	7.91	7.71	7.52	7.37	7.02	6.48	6.04	5.66	5.32	5.02	4.74
16	8.88	8.66	8.46	8.27	8.12	7.75	7.20	6.74	6.35	6.00	5.69	5.40
17	9.65	9.44	9.24	9.04	8.87	8.50	7.93	7.46	7.06	6.69	6.37	6.07
18	10.44	10.22	10.00	9.80	9.63	9.26	8.66	8.18	7.77	7.39	7.07	6.76
19	11.23	11.01	10.79	10.57	10.39	10.02	9.41	8.92	8.50	8.11	7.77	7.45
20	12.03	11.80	11.57	11.35	11.17	10.80	10.17	9.66	9.23	8.83	8.48	8.16
21	12.84	12.61	12.38	12.15	11.96	11.58	10.94	10.43	9.98	9.56	9.21	8.87
22	13.65	13.42	13.19	12.96	12.75	12.37	11.72	11.19	10.73	10.31	9.94	9.59
23	14.47	14.23	14.00	13.77	13.56	13.16	12.49	11.95	11.49	11.05	10.68	10.33
24	15.29	15.05	14.81	14.58	14.37	13.97	13.28	12.73	12.26	11.81	11.42	11.07
25	16.12	15.88	15.64	15.40	15.19	14.78	14.08	13.52	13.03	12.57	12.18	11.81

TABLE 4 (continued)

Required number of circuits	Weighted choice											
	1.0	1.5	2.0	2.5	3.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0
	Overflow traffic in erlangs											
26	16.96	16.72	16.48	16.24	16.03	15.60	14.88	14.30	13.81	13.34	12.94	12.56
27	17.80	17.55	17.31	17.07	16.85	16.42	15.69	15.11	14.60	14.11	13.71	13.32
28	18.64	18.39	18.14	17.90	17.68	17.24	16.50	15.90	15.39	14.90	14.47	14.09
29	19.49	19.23	18.98	18.74	18.52	18.07	17.32	16.71	16.19	15.68	15.25	14.85
30	20.34	20.09	19.84	19.59	19.36	18.90	18.14	17.52	16.99	16.48	16.04	15.63
31	21.19	20.93	20.68	20.44	20.20	19.74	18.97	18.34	17.80	17.27	16.82	16.41
32	22.05	21.79	21.54	21.29	21.06	20.59	19.80	19.16	18.61	18.07	17.62	17.20
33	22.91	22.65	22.40	22.15	21.92	21.43	20.63	19.99	19.43	18.88	18.42	17.99
34	23.77	23.52	23.27	23.02	22.78	22.29	21.47	20.82	20.25	19.70	19.22	18.78
35	24.64	24.38	24.13	23.88	23.64	23.14	22.31	21.66	21.08	20.50	20.03	19.58
36	25.51	25.24	24.99	24.75	24.50	24.00	23.16	22.49	21.90	21.33	20.84	20.38
37	26.38	26.12	25.87	25.62	25.37	24.86	24.01	23.33	22.74	22.15	21.65	21.19
38	27.25	26.99	26.74	26.49	26.24	25.72	24.86	24.18	23.58	22.98	22.47	22.00
39	28.13	27.86	27.61	27.36	27.11	26.59	25.72	25.03	24.42	23.81	23.29	22.81
40	29.01	28.74	28.48	28.23	27.99	27.45	26.57	25.88	25.26	24.64	24.11	23.63
41	29.89	29.62	29.36	29.11	28.86	28.33	27.44	26.74	26.11	25.48	24.94	24.45
42	30.77	30.51	30.24	29.99	29.74	29.20	28.30	27.60	26.96	26.32	25.77	25.27
43	31.66	31.39	31.13	30.88	30.63	30.09	29.17	28.46	27.81	27.17	26.61	26.10
44	32.54	32.28	32.02	31.77	31.51	30.97	30.04	29.32	28.68	28.01	27.44	26.93
45	33.43	33.17	32.91	32.66	32.40	31.85	30.91	30.19	29.53	28.86	28.29	27.76
46	34.32	34.06	33.80	33.55	33.29	32.73	31.79	31.06	30.40	29.72	29.14	28.60
47	35.21	34.95	34.69	34.43	34.18	33.61	32.66	31.93	31.26	30.57	29.98	29.43
48	36.11	35.84	35.58	35.32	35.07	34.51	33.55	32.80	32.13	31.43	30.83	30.28
49	37.00	36.74	35.48	36.22	35.96	35.40	34.43	33.69	33.01	32.29	31.68	31.12
50	37.90	37.64	37.38	37.12	36.86	36.29	35.32	34.57	33.87	33.15	32.53	31.97

TABLE 4 (continued)

Required number of circuits	Weighted choice											
	18.0	20.0	22.0	24.0	26.0	28.0	30.0	35.0	40.0	45.0	50.0	52.0
	Overflow traffic in erlangs											
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.85	0.62	0.28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	1.43	1.21	0.99	0.79	0.56	0.35	0.19	0.0	0.0	0.0	0.0	0.0
11	2.00	1.78	1.57	1.36	1.16	0.97	0.77	0.25	0.0	0.0	0.0	0.0
12	2.60	2.37	2.15	1.94	1.75	1.56	1.37	0.93	0.35	0.0	0.0	0.0
13	3.21	2.97	2.75	2.53	2.33	2.13	1.95	1.52	1.11	0.67	0.26	0.13
14	3.83	3.59	3.36	3.14	2.93	2.73	2.54	2.10	1.70	1.32	0.93	0.77
15	4.47	4.22	3.99	3.75	3.54	3.33	3.13	2.69	2.29	1.92	1.55	1.41
16	5.12	4.86	4.62	4.39	4.16	3.94	3.74	3.29	2.89	2.51	2.15	2.01
17	5.79	5.52	5.27	5.03	4.80	4.57	4.36	3.90	3.49	3.11	2.75	2.61
18	6.46	6.19	5.94	5.68	5.44	5.21	4.99	4.52	4.10	3.71	3.35	3.21
19	7.15	6.87	6.61	6.34	6.10	5.86	5.63	5.14	4.71	4.32	3.95	3.81
20	7.85	7.56	7.29	7.02	6.76	6.51	6.28	5.78	5.34	4.94	4.57	4.43
21	8.55	8.26	7.97	7.69	7.43	7.18	6.94	6.43	5.97	5.56	5.19	5.05
22	9.27	8.95	8.67	8.38	8.11	7.85	7.61	7.09	6.62	6.20	5.82	5.67
23	9.99	9.67	9.37	9.08	8.81	8.54	8.29	7.75	7.27	6.85	6.46	6.31
24	10.72	10.39	10.09	9.79	9.51	9.23	8.97	8.42	7.93	7.50	7.10	6.95
25	11.45	11.12	10.81	10.50	10.22	9.93	9.66	9.09	8.60	8.16	7.75	7.60

TABLE 4 (continued)

Required number of circuits	Weighted choice											
	18.0	20.0	22.0	24.0	26.0	28.0	30.0	35.0	40.0	45.0	50.0	52.0
	Overflow traffic in erlangs											
26	12.20	11.86	11.54	11.22	10.92	10.63	10.36	9.78	9.27	8.83	8.41	8.26
27	12.95	12.60	12.27	11.94	11.64	11.34	11.06	10.47	9.95	9.49	9.07	8.91
28	13.70	13.35	13.01	12.68	12.37	12.06	11.77	11.17	10.63	10.17	9.75	9.59
29	14.46	14.10	13.76	13.41	13.10	12.79	12.49	11.87	11.32	10.86	10.42	10.26
30	15.23	14.85	14.51	14.16	13.84	13.52	13.21	12.58	12.01	11.54	11.10	10.94
31	16.01	15.61	15.27	14.91	14.59	14.26	13.95	13.29	12.72	12.24	11.79	11.62
32	16.78	16.38	16.02	15.66	15.33	15.00	14.68	14.01	13.42	12.93	12.48	12.31
33	17.56	17.16	16.80	16.42	16.09	15.74	15.42	14.74	14.14	13.64	13.18	13.01
34	18.35	17.94	17.57	17.19	16.85	16.50	16.16	15.47	14.85	14.35	13.88	13.71
35	19.14	18.73	18.34	17.96	17.61	17.25	16.91	16.20	15.58	15.06	14.59	14.41
36	19.93	19.51	19.12	18.73	18.38	18.02	17.67	16.94	16.30	15.78	15.31	15.13
37	20.74	20.30	19.91	19.51	19.15	18.78	18.43	17.69	17.03	16.51	16.02	15.84
38	21.53	21.10	20.70	20.29	19.92	19.56	19.19	18.43	17.77	17.24	16.74	16.56
39	22.35	21.89	21.49	21.08	20.71	20.33	19.96	19.18	18.50	17.96	17.46	17.28
40	23.15	22.69	22.28	21.86	21.49	21.11	20.73	19.94	19.25	18.70	18.19	18.00
41	23.96	23.50	23.09	22.66	22.27	21.88	21.50	20.70	19.99	19.44	18.93	18.74
42	24.78	24.31	23.88	23.45	23.06	22.67	22.28	21.47	20.74	20.18	19.66	19.47
43	25.60	25.12	24.69	24.25	23.86	23.46	23.07	22.23	21.50	20.93	20.40	20.20
44	26.43	25.93	25.50	25.05	24.66	24.25	23.85	23.00	22.25	21.67	21.14	20.94
45	27.25	26.75	26.31	25.86	25.46	25.05	24.64	23.78	23.01	22.43	21.89	21.68
46	28.08	27.57	27.13	26.67	26.26	25.85	25.43	24.55	23.77	23.18	22.64	22.43
47	28.92	28.40	27.94	27.48	27.07	26.65	26.23	25.33	24.54	23.94	23.39	23.18
48	29.74	29.22	28.76	28.29	27.88	27.45	27.03	26.11	25.30	24.70	24.15	23.94
49	30.59	30.05	29.59	29.11	28.69	28.26	27.83	26.90	26.08	25.46	24.90	24.69
50	31.42	30.89	30.41	29.93	29.51	29.08	28.64	27.69	26.85	26.23	25.67	25.45

TABLE 5

Number of circuits for a loss probability p = *0.01 for overflow traffic, using the maximum variance method*

Required number of circuits	Weighted mean peakedness factor										
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
	Overflow traffic in erlangs										
1	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.15	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.46	0.32	0.19	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.87	0.72	0.57	0.42	0.28	0.11	0.0	0.0	0.0	0.0	0.0
5	1.36	1.20	1.03	0.87	0.71	0.55	0.39	0.22	0.0	0.0	0.0
6	1.91	1.73	1.55	1.38	1.20	1.04	0.87	0.70	0.53	0.35	0.15
7	2.50	2.30	2.11	1.92	1.74	1.56	1.38	1.21	1.03	0.86	0.68
8	3.13	2.91	2.71	2.50	2.31	2.12	1.93	1.75	1.57	1.38	1.21
9	3.78	3.55	3.33	3.12	2.91	2.71	2.51	2.32	2.12	1.94	1.75
10	4.46	4.22	3.98	3.76	3.54	3.32	3.11	2.91	2.71	2.51	2,32
11	5.16	4.90	4.65	4.42	4.18	3.96	3.74	3.53	3.32	3.11	2.91
12	5.88	5.60	5.34	5.09	4.85	4.61	4.38	4.16	3.94	3.73	3.52
13	6.61	6.32	6.05	5.78	5.53	5.28	5.05	4.81	4.59	4.36	4.15
14	7.35	7.05	6.77	6.49	6.23	5.97	5.72	5.48	5.24	5.01	4.79
15	8.11	7.80	7.50	7.21	6.94	6.67	6.41	6.16	5.92	5.68	5.44
16	8.88	8.55	8.24	7.95	7.66	7.38	7.12	6.85	6.60	6.35	6.11
17	9.65	9.32	9.00	8.69	8.39	8.11	7.83	7.56	7.30	7.04	6.79
18	10.44	10.09	9.76	9.44	9.13	8.84	8.55	8.27	8.00	7.24	7.48
19	11.23	10.87	10.53	10.20	9.88	9.58	9.28	9.00	8.72	8.45	8.18
20	12.03	11.66	11.31	10.97	10.64	10.33	10.02	9.73	9.44	9.16	8.89
21	12.84	12.46	12.09	11.75	11.41	11.09	10.77	10.47	10.18	9.89	9.61
22	13.65	13.26	12.89	12.53	12.18	11.85	11.53	11.22	10.92	10.62	10.34
23	14.47	14.07	13.68	13.32	12.96	12.62	12.29	11.97	11.66	11.36	11.07
24	15.29	14.88	14.49	14.11	13.75	13.40	13.06	12.73	12.42	12.11	11.81
25	16.12	15.70	15.30	14.91	14.54	14.18	13.84	13.50	13.18	12.86	12.56

TABLE 5 (continued)

Required number of circuits	Weighted mean peakedness factor										
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
	Overflow traffic in erlangs										
26	16.96	16.53	16.11	15.72	15.34	14.97	14.62	14.28	13.94	13.62	13.31
27	17.80	17.35	16.93	16.53	16.14	15.77	15.41	15.06	14.72	14.39	14.07
28	18.64	18.19	17.76	17.34	16.95	16.57	16.20	15.84	15.49	15.16	14.83
29	19.49	19.02	18.58	18.16	17.76	17.37	16.99	16.63	16.28	15.93	15.60
30	20.34	19.87	19.42	18.99	18.57	18.18	17.79	17.42	17.06	16.71	16.37
31	21.19	20.71	20.25	19.81	19.39	18.99	18.60	18.22	17.85	17.50	17.15
32	22.05	21.56	21.09	20.65	20.22	19.80	19.41	19.02	18.65	18.29	17.93
33	22.91	22.41	21.93	21.48	21.04	20.63	20.22	19.83	19.45	19.08	18.72
34	23.77	23.27	22.78	22.32	21.88	21.45	21.04	20.64	20.25	19.88	19.51
35	24.64	24.12	23.63	23.16	22.71	22.28	21.86	21.45	21.06	20.68	20.31
36	25.51	24.98	24.48	24.01	23.55	23.11	22.68	22.27	21.87	21.48	21.10
37	26.38	25.85	25.34	24.85	24.39	23.94	23.51	23.09	22.68	22.29	21.91
38	27.25	26.71	26.20	25.70	25.23	24.78	24.34	23.91	23.50	23.10	22.71
39	28.13	22.58	27.06	26.56	26.08	25.61	25.17	24.74	24.32	23.91	23.52
40	29.01	28.45	27.92	27.41	26.92	26.46	26.00	25.57	25.14	24.73	24.33
41	29.89	29.32	28.79	28.27	27.78	27.30	26.84	26.40	25.97	25.55	25.15
42	30.77	30.20	29.65	29.13	28.63	28.15	27.68	27.23	26.80	26.37	25.96
43	31.66	31.08	30.52	30.00	29.49	29.00	28.53	28.07	27.63	27.20	26.78
44	32.54	31.96	31.40	30.86	30.35	29.85	29.37	28.91	28.46	28.03	27.61
45	33.43	32.84	32.27	31.73	31.21	30.70	30.22	29.75	29.30	28.86	28.43
46	34.32	33.72	33.14	32.60	32.07	31.56	31.07	30.60	30.14	29.69	29.26
47	35.21	34.61	34.02	33.47	32.93	32.42	31.92	31.44	30.98	30.53	30.09
48	36.11	35.49	34.90	34.34	33.80	33.28	32.78	32.29	31.82	31.37	30.92
49	37.00	36.38	35.78	35.21	34.67	34.14	33.63	33.14	32.67	32.21	31.26
50	37.90	37.27	36.67	36.09	35.54	35.01	34.49	34.00	33.52	33.05	32.59

TABLE 5 (continued)

Required number of circuits	Weighted mean peakedness factor												
	2.1	2.2	2.3	2.4	2.5	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0
	Overflow traffic in erlangs												
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.50	0.31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	1.03	0.84	0.66	0.46	0.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	1.57	1.38	1.20	1.01	0.82	0.63	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	2.13	1.94	1.75	1.56	1.38	1.19	0.80	0.35	0.0	0.0	0.0	0.0	0.0
11	2.71	2.52	2.32	2.13	1.94	1.75	1.36	0.97	0.54	0.0	0.0	0.0	0.0
12	3.31	3.11	2.91	2.71	2.52	2.32	1.93	1.55	1.15	0.73	0.0	0.0	0.0
13	3.93	3.72	3.52	3.31	3.11	2.91	2.51	2.12	1.73	1.33	0.91	0.39	0.0
14	4.57	4.35	4.13	3.92	3.72	3.51	3.11	2.71	2.31	1.91	1.51	1.09	0.61
15	5.21	4.99	4.77	4.55	4.34	4.13	3.71	3.30	2.90	2.50	2.10	1.70	1.27
16	5.88	5.64	5.42	5.19	4.97	4.75	4.33	3.91	3.50	3.10	2.69	2.29	1.88
17	6.55	6.31	6.07	5.84	5.62	5.39	4.96	4.53	4.11	3.70	3.29	2.89	2.48
18	7.23	6.99	6.74	6.51	6.27	6.05	5.60	5.16	4.73	4.31	3.90	3.49	3.08
19	7.93	7.67	7.42	7.18	6.94	6.71	6.25	5.80	5.36	4.93	4.51	4.09	3.68
20	8.63	8.37	8.11	7.86	7.62	7.38	6.91	6.45	6.00	5.56	5.13	4.71	4.29
21	9.34	9.07	8.81	8.55	8.30	8.06	7.57	7.11	6.65	6.20	5.76	5.33	4.91
22	10.06	9.78	9.52	9.25	9.00	8.74	8.25	7.77	7.31	6.85	6.40	5.97	5.53
23	10.78	10.50	10.23	9.96	9.70	9.44	8.93	8.45	7.97	7.51	7.05	6.61	6.17
24	11.52	11.23	10.95	10.68	10.41	10.14	9.63	9.13	8.64	8.17	7.71	7.25	6.81
25	12.26	11.96	11.68	11.40	11.12	10.85	10.33	9.82	9.32	8.84	8.37	7.91	7.45

TABLE 5 (continued)

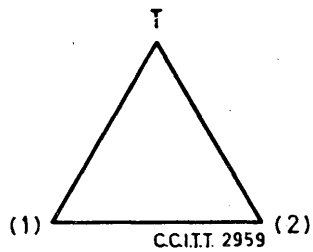
Required number of circuits	Weighted mean peakedness factor												
	2.1	2.2	2.3	2.4	2.5	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0
	Overflow traffic in erlangs												
26	13.00	12.70	12.41	12.12	11.84	11.57	11.03	10.51	10.01	9.51	9.04	8.57	8.11
27	13.75	13.45	13.15	12.86	12.57	12.29	11.74	11.21	10.70	10.20	9.71	9.23	8.76
28	14.51	14.20	13.89	13.60	13.30	13.02	12.46	11.92	11.40	10.89	10.39	9.91	9.43
29	15.27	14.96	14.64	14.34	14.04	13.75	13.18	12.63	12.10	11.58	11.08	10.59	10.10
30	16.04	15.72	15.40	15.09	14.79	14.49	13.91	13.35	12.81	12.28	11.77	11.27	10.78
31	16.81	16.48	16.16	15.85	15.54	15.23	14.65	14.08	13.53	12.99	12.47	11.96	11.46
32	17.59	17.25	16.93	16.61	16.29	15.98	15.38	14.81	14.25	13.70	13.17	12.65	12.15
33	18.37	18.03	17.70	17.37	17.05	16.74	16.13	15.54	14.97	14.42	13.88	13.36	12.84
34	19.16	18.81	18.47	18.14	17.81	17.50	16.88	16.28	15.70	15.14	14.59	14.06	13.54
35	19.94	19.59	19.25	18.91	18.58	18.26	17.63	17.02	16.43	15.87	15.31	14.77	14.24
36	20.74	20.38	20.03	19.69	19.35	19.02	18.39	17.77	17.17	16.59	16.03	15.49	14.95
37	21.53	21.17	20.81	20.47	20.13	19.79	19.15	18.52	17.92	17.33	16.76	16.20	15.66
38	22.33	21.96	21.60	21.25	20.90	20.57	19.91	19.28	18.66	18.07	17.49	16.93	16.38
39	23.14	22.76	22.40	22.04	21.69	21.34	20.68	20.04	19.41	18.81	18.22	17.65	17.10
40	23.94	23.56	23.19	22.83	22.47	22.12	21.45	20.80	20.17	19.56	18.96	18.38	17.82
41	24.75	24.36	23.99	23.62	23.26	22.91	22.23	21.56	20.92	20.31	19.70	19.12	18.55
42	25.56	25.17	24.79	24.42	24.05	23.70	23.00	22.33	21.69	21.06	20.45	19.86	19.28
43	26.38	25.98	25.60	25.22	24.85	24.49	23.78	23.11	22.45	21.82	21.20	20.60	20.01
44	27.19	26.79	26.40	26.02	25.65	25.28	24.57	23.88	23.22	22.57	21.95	21.34	20.75
45	28.01	27.61	27.21	26.82	26.45	26.07	25.36	24.66	23.99	23.34	22.71	22.09	21.49
46	28.84	28.43	28.03	27.63	27.25	26.87	26.15	25.44	24.76	24.10	23.47	22.84	22.24
47	29.66	29.25	28.84	28.44	28.06	27.68	26.94	26.23	25.54	24.87	24.23	23.60	22.98
48	30.49	30.07	29.66	29.26	28.86	28.48	27.23	27.01	26.32	25.64	24.99	24.36	23.74
49	31.32	30.89	30.48	30.07	29.68	29.29	28.53	27.80	27.10	26.42	25.76	25.11	24.49
50	32.15	31.72	31.30	30.89	30.49	30.10	29.33	28.60	27.89	27.20	26.53	25.88	25.25

RECOMMENDATION E.522 RECOMMENDATION Q.89

NUMBER OF CIRCUITS IN A HIGH-USAGE GROUP

1. *Introduction*

For the economic planning of an alternate routing network the number of circuits in a high-usage group should be determined so that the annual charges for the whole network arrangement is a minimum. This is done under the constraint that given requirements for the grade of service are fulfilled. In the optimum arrangement, the cost per erlang of carrying a marginal amount of traffic over the high-usage route or over the alternative route is the same.



The optimum number of high-usage circuits, n, from one exchange (1) to another exchange (2) is therefore obtained from the following expression when the overflow traffic is routed over a transit exchange T (route 1-T-2).

$$F_n(A) = A\{E_1n(A) - E_1(n+1)(A)\} = M \cdot \frac{\text{annual charge (1-2)}}{\text{annual charge (1-}T\text{-2)}}$$

A is the traffic flow offered, for the relation " 1-2 ", in the Erlang loss formula for a full availability group. The expression $F_n(A)$ gives the marginal occupancy (improvement function[1]) for the high-usage group, if one more circuit were added M is the *marginal utilization factor for the final route* " 1-T-2 " (which has nothing to do with cost ratio), if one additional circuit were provided. The annual charges are marginal charges for adding one additional circuit to route " 1-2 " and likewise to route " 1-T-2 ".

Planning of an alternate routing network is described in the literature (see, *inter alia*, the bibliography contained in Annex 1).

2. *Recommended practical method*

2.1 *Field of application*

It must be recognized that the conditions applying to alternative routing will vary widely between the continental network and the intercontinental network. Significant differences between the two cases apply to the length and cost of circuits, the traffic flow and the different times at which the busy hours occur. The method described attempts to take account of these factors in so far as it is practicable to do so in any simplified procedure.

[1] The values $F_n(A)$ are tabulated in A. JENSEN, *Moe's Principle*, Copenhagen, 1950.

2.2 *Traffic statistics*

The importance of reliable traffic estimates should be emphasized. Traffic estimates are required for each of the relations in question, for both the busy hour of the relation and for the busy hour of each link of the routes to which the traffic overflows. Since this may be affected by the high-usage arrangements finally adopted, it will be necessary to have traffic estimates for each relation covering most of the significant hours of the day. This applies particularly to the intercontinental network where the final routes carry traffic components with widely differing busy hours.

2.3 *Basis of the recommended method*

The method is based on a simplification of the economic dimensioning equations described under 1. Introduction. The simplifying assumptions are:

i) the ratios of the alternative/high-usage annual charges are grouped in classes and a single ratio selected as representative for each class. This is acceptable because total network costs are known to be relatively insensitive to changes in the annual charges ratio;

ii) the marginal utilization factor M applicable to the overflow routes is regarded as constant within a range of circuit group sizes;

Size of group (number of circuits)	Value of M
for less than 10	0.6
for 10 or more	0.8

iii) each high-usage group will be dimensioned against the cheapest alternative route to which traffic overflows. (That is, the effect of parallel alternative routes is ignored.)

Where greater precision is required in either network or individual route dimensioning, more sophisticated methods may be employed. The utility of computers in this work is recognized [1].

2.4 *Determination of cost ratio*

In continental and intercontinental working, the number of circuits to be provided in high-usage circuit groups depends upon the ratio of the annual charges estimated by the Administrations * involved. The annual charge ratio (see Table 1 at the end of the Recommendation) is defined as:

$$R = \frac{\text{annual charge of one additional circuit on the alternative route}}{\text{annual charge of one additional circuit on the high-usage route}}$$

* or recognized private operating agencies.

[1] See Question 18/XIII.

The " annual charge of one additional circuit on the alternative route " is calculated by summing:

— the annual charge per circuit of each link comprising the alternative route and

— the annual charge of switching one circuit at each intermediate switching centre.

The traffic value used should be the value of traffic offered to the high-usage route during the busy hour of the final route. It is likely that some of the busy hours of the circuit groups or links forming an alternative route will not coincide with the busy hour of the relation. Some of these links may therefore receive no overflow necessitating additional circuits and there will be no annual charges for this link of the alternative route. Several hours must be examined to determine the ratio between the annual charges for the alternative and the high-usage route. It is possible that the ratio is less than unity but this case is not shown in the table because the provision of high-usage circuits would then be used for grade of service reasons. Cases of this type can introduce valuable economies but the calculation of the appropriate number of circuits to be provided is best handled by a computer.

The value determined for R should then be employed to select in Table 1 the precise (or next higher) value of annual charges ratio for use in traffic tables. The value of annual charges ratios may be grouped in the following general sets:

a) within a single continent or other smaller closely connected land mass involving distances up to 1000 miles, high traffic and frequently one-way operation:

Annual charges ratio: $R = 1.5$; 2.0; 3.0 and 4

b) intercontinental working involving long distances, small traffic and usually two-way operation:

Annual charges ratio: $R = 1.1$; 1.3 and 1.5

2.5 *Use of method*

High-usage circuit groups carrying random traffic can be dimensioned from Table 1.

Step 1. — Estimate the annual charges ratio R as described under 2.4. (There is little difference between adjacent ratios.) If this ratio is difficult to estimate, the values underlined in a) and b), section 2.4, should be used.

Step 2. — Consult Table 1 to determine the number of high-usage circuits N.

Note. — When two values of N are given the right-hand figure applies to alternative routes of more than 10 circuits, the left-hand figure applies to smaller groups. The left-hand figure is omitted when it is no longer possible for the alternative route to be small.

3. *Service considerations*

On intercontinental circuits, where both-way operation is employed, a minimum of two circuits may be economical. Service considerations may also favour an increase in the number of direct circuits provided, particularly where the annual charges ratio approaches unity.

Although the dimensioning of high-usage groups is normally determined by traffic flows and annual charges ratios, it is recognized that such groups form part of a network having service requirements relative to the subscriber. The ability to handle the offered traffic with acceptable traffic efficiency should be tempered by the overall network considerations on quality of service.

The quality of service feature, which is of primary importance in a system of high-usage and final circuit groups, is the advantage derived from direct circuits versus multi-link connections. A liberal use of direct high-usage circuit groups, taking into account the economic factors, favours a high quality of service to the subscriber. It is recommended that new high-usage groups should be provided whenever the traffic flow and cost ratios are not conclusive. This practice may result in direct high-usage groups of two circuits or more.

The introduction of high-usage groups improves the overall grade of service and provides better opportunities of handling traffic during surges and breakdown conditions. When high-usage links bypass the main backbone final routes the introduction of high-usage routes can assist in avoiding expenses which might otherwise be incurred in keeping below the maximum number of long-distance links in series. In the future, more measurements of traffic flows may be necessary for international accounting purposes and high-usage circuits should make this easier.

TABLE 1

Number of high-usage circuits
for different values of offered traffic, annual charges ratios and sizes of overflow groups

Traffic offered during network busy hour (erlangs)	Annual charges ratios						Number of circuits if there is no overflow route, for $p = 0.01$
	1.1	1.3	1.5	2.0	3.0	4.0	
	Minimum circuit occupancies for high-usage traffic						
	0.545/0.727	0.46/0.615	0.4/0.53	0.3/0.4	0.2/0.26	0.15/0.2	
	N, number of high-usage circuits A/B, where A is for less than 10 circuits in the overflow group ($M = 0.6$). B is for 10 or more circuits in the overflow group ($M = 0.8$).						
1.5	1/0	1/0	2/1	2/2	3/2	3/3	6
1.75	1/0	2/1	2/1	3/2	3/3	4/3	6
2.0	1/0	2/1	2/2	3/2	4/3	4/4	7
2.25	2/0	2/1	3/2	3/3	4/4	5/4	7
2.5	2/0	3/1	3/2	4/3	5/4	5/5	7
2.75	2/1	3/2	3/2	4/3	5/4	5/5	8
3	3/1	3/2	4/3	4/4	5/5	6/5	8
3.5	3/1	4/2	4/3	5/4	6/5	7/6	9
4.0	4/2	4/3	5/4	6/5	7/6	7/7	10
4.5	4/2	5/3	6/4	6/6	7/7	8/7	10
5.0	5/3	6/4	6/5	7/6	8/7	9/8	11
5.5	5/3	6/5	7/5	8/7	9/8	9/9	12
6.0	6/3	7/5	7/6	8/7	9/9	10/9	13
7.0	7/4	8/6	8/7	10/8	11/10	11/11	14
8.0	8/5	9/7	10/8	11/10	12/11	13/12	15
9.0	/6	/8	/9	/11	/12	/13	17
10.0	/7	/9	/10	/12	/14	/15	18
12.0	/9	/11	/12	/14	/16	/17	20
15.0	/12	/14	/16	/18	/20	/21	24
20.0	/16	/19	/21	/23	/25	/27	30
25.0	/21	/24	/26	/29	/31	/33	36
30.0	/26	/29	/31	/34	/37	/38	42

ANNEX
(to Recommendation E.522 (Q.89)

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CHAPTER IV

GRADE OF SERVICE

RECOMMENDATION E.540 RECOMMENDATION Q.95

OVERALL GRADE OF SERVICE OF THE INTERNATIONAL PART OF AN INTERNATIONAL CONNECTION[1]

1. The International Routing Plan envisages that international traffic relations may be served by any of the following routing arrangements:

a) direct circuits;

b) transit operation involving one or more transit centres for all connections,

c) direct high-usage circuits with overflow via one or more transit centres.

In principle there would be merit in dimensioning international facilities to provide the same grade of service for all relations, however served. Practical considerations make it advisable to depart from one universal value.

2. Direct circuit groups are dimensioned, according to Recommendation E.520 (Q.87) on the basis of $p = 1\%$ loss probability during the mean busy hour. An exception is permitted for small groups of very long international circuits for which $p = 3\%$ loss probability is accepted for six or fewer circuits. As the traffic increases the grade of service improves progressively until $p = 1\%$ loss value is reached for 20 circuits.

3. For the relations served exclusively by transit operation the grade of service will deteriorate with the number of transit centres in the connection. Measurements made on congestion in such circumstances suggest that the overall grade of service for up to six links in tandem is less than twice the congestion of any of the six links in the chain. Hence, for a series of routes, each dimensioned for $p = 1\%$, the overall grade of service should seldom exceed 2%. An East-West type of connection would have the advantage of different busy hours on the various links. Corresponding advantage would not apply to North-South circuits.

In the case of relations served by high-usage circuits the overflow traffic will route over at least two links and, hence, will be subject to the same deterioration of service as in the case for transit traffic. However, a substantial part of the traffic will be connected over the high-usage circuits and the overall grade of service will approximate that of the relations served solely by direct circuits.

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[1] See also Question 17/XIII: Overall grade of service for international connections (subscriber to subscriber).

It is desirable that at least one high-usage circuit should always be provided between a CT3 and its homing CT1, even though the circuit may not be wholly justified on economic considerations alone. The provision of such circuits would improve the transmission as well as the grade of service; these considerations should encourage an increase both in traffic and in the revenue-earning capacity of the circuits provided.

The overall grade of service for the international part of a connection is a contributory factor to the overall grade of service from the calling party in one country to the called party in another.

However, such a circuit should not be provided unless there is a measurable amount of traffic which exists, or can be foreseen in the busy hour.

RECOMMENDATION E.541 RECOMMENDATION Q.96

ACCEPTABLE REDUCTION IN THE NUMBER OF CIRCUITS OF A FINAL ROUTE IN THE EVENT OF A BREAKDOWN

1. *Maximum traffic loading*

1.1 It is the experience of Administrations that an acceptable automatic service on a final circuit group cannot be maintained if the traffic loading on the group exceeds a level corresponding to a calculated Erlang grade of service of 10%. Beyond this traffic loading, and especially owing to the cumulative effect of repeat attempt calls, the service rapidly deteriorates.

1.2 It is recommended, therefore, that this traffic loading be adopted as a criterion to determine whether special corrective measures, described in section 3 of this Recommendation, should be introduced in those cases where it is expected that the abnormal conditions will persist for more than fifteen minutes.

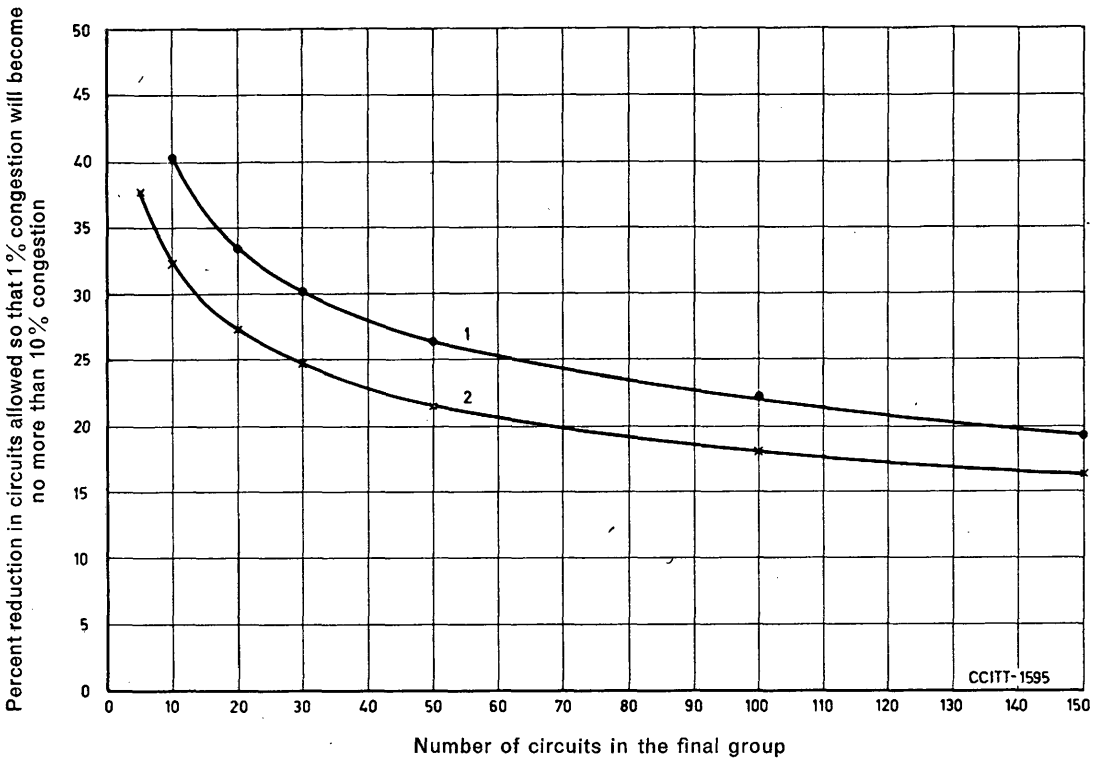
2. *Tolerated proportionate reduction in circuits*

2.1 The following curve indicates the proportionate reduction in circuits that may be tolerated for a short period, 15 minutes for example, under normal busy-hour conditions, on a full availability circuit group dimensioned for 1% Erlang loss, in accordance with the above traffic overload criterion. Table 1 gives the figures used to plot the curve.

2.2 This curve is intended merely as a guide. If the breakdown occurs during an exceptionally busy hour, the permissible proportionate reduction will be less. Conversely, if the breakdown occurs during an hour of light traffic a higher proportionate reduction in circuits could be tolerated. A higher reduction might also be acceptable after an appropriate oral announcement has been introduced. In the general case, a knowledge of the circuit occupancy will enable an estimate to be made of the prevailing Erlang loss figure, with the reduced number of circuits.

The permissible reduction in the case of large groups should not be exceeded, otherwise very serious congestion can result from repeated attempts.

* or recognized private operating Agencies.



1 : Peakedness factor = 2.5
2 : Random traffic (peakedness factor = 1.0)

Acceptable reduction in the number of circuits in a final group in the event of a breakdown

TABLE 1

Acceptable % reduction in the number of circuits

Number of circuits	If originally operating at 1% congestion, % reduction in circuits allowed to yield 10% congestion	
	Random traffic (peakedness factor = 1.0)	Peakedness factor = 2.5
5	37.7	—
10	32.3	40.2
20	27.2	33.3
30	24.8	30.1
50	21.7	26.5
100	18.3	22.4
150	16.7	19.7

3. *Corrective measures*

3.1 In order to minimize the effect of a breakdown the following procedures should be adopted:

3.1.1 Administrations * should prepare plans for dealing with breakdowns on major routes. Such plans should include dispersal of traffic and prearranged alternatives for emergency use.

3.1.2 Alternative auxiliary routes, not normally economic for the relations affected, should be opened up. In such cases recourse should first be had to supplementary routing indicated in the International Routing Plan but other routings may need to be used. Adequate precautions should be taken to ensure that in no case a call will be routed through a CT previously traversed.

3.1.3 Where TASI systems are used, the number of TASI circuits on the affected route should be expanded but not to exceed a 20% increase.

3.2 The traffic which would normally be offered to the final route affected by breakdown could be reduced in the following ways:

3.2.1 Calls encountering congestion are connected, via overflow, which are normally engaged, to suitable recorded announcements. These announcements could state that a breakdown had occurred and give appropriate instructions to the callers.

* or recognized private operating Agencies.

3.2.2 In order to reduce the risk of spreading congestion, reports indicating breakdown should be sent by network management signals, as an example, to other centres in order that traffic may be re-routed away from the affected route when this is possible. Reports made for example by network management signals [1] should be used to enable this announcement to be made at the originating centre.

Note. — This Recommendation refers to breakdowns on a final route; however, some of the procedures outlined above could be applied when a breakdown occurs on a high-usage route.

[1] See Question 4/XIII.

ANNEX

(to Volume VI, Part VI)

Definitions relating to traffic engineering appearing in Recommendation E.100

(see Volume II of the *White Book*)

. . . . . .

DEFINITION 18. — **Traffic carried (by a group of circuits or a group of switches)**

18.1 *Amount of traffic carried*

The amount of traffic carried (by a group of circuits or a group of switches) during any period is the sum of the holding times expressed in hours.

18.2 *Traffic flow*

The traffic flow (on a group of circuits or a group of switches) equals the amount of traffic divided by the duration of the observation, provided that the period of observation and the holding times are expressed in the same time units. Traffic flow calculated in this way is expressed in erlangs.

DEFINITION 19. — **Traffic offered (to a group of circuits or a group of switches)**

It is necessary to distinguish between traffic offered and traffic carried. The traffic carried is only equal to the traffic offered if all calls are immediately handled (by the group of circuits or group of switches being measured) without any call being lost or delayed on account of congestion.

The flow of traffic offered, and of traffic carried, is expressed in erlangs. The amount of traffic offered and of traffic carried is expressed in erlang hours.

DEFINITION 20. — **Measurement of busy hour traffic**

20.1 *Busy hour (of a group of circuits, a group of switches or an exchange, etc.)*

The busy hour is the uninterrupted period of 60 minutes for which the traffic is the maximum.

Note. — It is usual for the period of the busy hour and the amount of traffic in the busy hour to vary from day to day. In order to obtain a representative traffic estimate, it is recommended that an average value should be calculated from the measurement of a sample, as described later.

It is possible to calculate an average traffic flow which is the mean for the busy hours of the different days in the sample. An alternative method is to find the continuous 60-minute period when the average of the sample is the maximum and to obtain from this period the representative traffic flow. The following recommendations relating to the determination of the sample period and of the mean busy hour (sometimes called " time-consistent " busy hour) apply particularly to the second method.

20.2 *Mean busy hour (of a group of circuits, a group of switches, or an exchange, etc.)*

The mean busy hour is the uninterrupted period of 60 minutes for which the total traffic of a sample is the maximum.

Note. — If it is not known which 60-minute period constitutes the mean busy hour, a sample measurement taken over 10 days should be sufficient to enable the position of the mean busy hour to be determined. As it is desirable to have a uniform method of analysing the statistics thus obtained, the following method is recommended for adoption in the international service, the observations being made over quarter-hourly periods:

— for a number of consecutive days the values observed for the same quarter of an hour each day are added together;
— the mean busy hour is then determined as being the four consecutive quarters which together give the largest sum of observed values.

DEFINITION 21. — **Circuit usage for a group of international circuits (or an international circuit)**

The percentage ratio between the sum of the holding times during a specified period equal to 60 consecutive minutes at least and the total length of that specified period.

In the case of a group of circuits, the circuit usage corresponds to the average traffic density *per circuit* during the specified period.

Note. — Unless otherwise indicated, circuit usage is based on the busy hour.

LIST OF NEGATIVE DECISIONS TAKEN BY THE C.C.I.T.T. (BY THE C.C.I.F.)

DECISIONS	REFERENCE
1. The publication of an *International List of Telephone Exchanges* by the I.T.U. General Secretariat can be dispensed with.	Recommendation 12 *ter*, *Green Book* [1], Volume VI, p. 36.
2. A code for access to the international automatic network should not be standardized.	Recommendation 26 *ter*, *Green Book*, Volume VI, p. 73.
3. There is no case for allowing a terminal Administration * to receive a higher quota for outgoing calls than for incoming calls in order to take its publicity expenses (canvassing) into account.	Recommendation 58, *Green Book*, Volume VI, p. 118.
4. There is no point in keeping statistics of circuit out-of-service times.	Recommendation 62 *bis*, *Green Book*, Volume VI, p. 130.
5. The principle of charging for ineffective international automatic calls should be rejected.	Result of the study of Question 5 examined in 1956-1958.
6. The queueing system in an international automatic transit exchange with seizing priority for automatic transit calls cannot be generally recommended.	Result of the study of Question 19 examined in 1956-1958.
7. There is no occasion to modify the arrangements in the *Instructions for Operators* so that, in demand working, speedier treatment is given to ordinary calls with respect to other calls.	Result of the study of Question 26 examined in 1956-1958.
8. There is no occasion to modify the arrangements in the *Instructions for Operators* to make obligatory the insertion of the caller's name on the call ticket in the case of a *préavis* call.	Result of the study of Question 27 examined in 1956-1958.
9. There is no reason to change the simple charging principle now applied, according to which one surcharge only is payable, irrespective of the number of special facilities requested.	Conclusion from the study of Supplementary Question D, examined in 1958-1960.
10. It would not be advisable to examine tariff standards for the intercontinental service on the basis of the principles mentioned in Recommendation E.51, as the tariffs in that service are not at present established according to distance.	Conclusion from the study of Question H/XIII, examined in 1960-1964.

* or recognized private operating Agency.

[1] Volume VI of the *Green Book* is the outcome of the XVIIth Plenary Assembly of the C.C.I.F., Geneva 1954.

11. The European International Telephone Traffic Statistics published by virtue of Recommendation E.82 (see Volume II *bis* of the *Red Book*) should no longer appear but should be replaced by the world-wide statistics defined in new Recommendation E.82.	Conclusion from the study of Question 5/XIII, examined in 1960-1964.
12. It is not desirable, in the international telephone service, to apply a decreasing unit charge as a function of the duration of the telephone call.	Recommendation E.63, *Blue Book*, Volume II.
13. It is not desirable to introduce a new class of call at a reduced rate, called " deferred calls " in the international telephone service.	Recommendation E.64, *Blue Book*, Volume II.
14. There is no reason for granting a reduction in international telephone charges in favour of calls for the press.	Recommendation E.66, *Blue Book*, Volume II.

TELEPHONE OPERATION AND TARIFF QUESTIONS ENTRUSTED TO STUDY GROUP II FOR THE PERIOD 1968-1972

Question No.	Title	Remarks
1/II	Review of the new accounting procedures for international automatic and semi-automatic telephone traffic	
2/II	Definition of the traffic unit to be used in accounting between Administrations	Of concern to S.G. XIII
3/II	International accounting between Administrations for collect calls or credit-card calls	
4/II	Revision of the Recommendations in Series E relating to international accounts	
5/II	Revision of the Recommendations on international programme and television transmissions	
6/II	International calls between three or more stations located in two or more countries (conference or multiple calls)	The study groups concerned are to be informed of the results of this study
7/II	Requests for information on foreign numbers	
8/II	Standardization of call tickets	
9/II	Arrangements for the payment for public service telephone calls by persons travelling abroad	S.G. I. to be kept informed
10/II	Revision of the *Instructions for the International Telephone Service*	
11/II	Preparation of instructions for users of the international automatic service	In conjunction with S.G. XIII
12/II	Telephone Regulations	
13/II	Determination of the number of circuits as a function of the traffic in manual operation. Revision of Recommendation E.510 (formerly E.91) and preparation of new Recommendations on this point, if required.	

Question No.	Title	Remarks
14/II	Programme of study of human factors in customer international dialling	Of concern to S.G.s XII and XIII
15/II	Possible customer confusion in interpreting the audible tones encountered in fully automatic working in the international service	Of concern to S.G. XIII
16/II	Customer dialling performance in fully automatic working in the international network	Of concern to S.G. XIII
17/II	Standardization of the use and printing of the new symbols and separators in national and international telephone numbers	

Notes to the effect that a particular question is of interest to a Study Group are intended primarily for the information of the members of the Study Group to which the question is assigned, to enable them to arrange for the necessary co-ordination within their national Administrations, in accordance with the decision taken by the Plenary Assembly.

Question 1/II — Review of the new accounting procedures for international automatic and semi-automatic telephone traffic

Note. — The continuing evolution in the growth of the world telephone network and the need for constant improvement of its efficiency make it necessary to keep the new accounting procedures for international automatic and semi-automatic telephone traffic under continuous review.

Question 2/II — Definition of the traffic unit to be used in accounting between Administrations *

In Recommendation E.250, it is advocated that in certain cases (paragraph 5.1) the country of destination be remunerated on the basis of the traffic unit, as is also the case for the switched transit countries (paragraph 9.2).

The traffic unit can be defined in various ways:

— 1 minute of conversation time,

— 1 minute of holding time,

— 1 erlang × hour (conversation time),

— 1 erlang × hour (holding time).

Use of any one of these four units of measurement has direct repercussions on the choice of measuring devices and their connection points. The volume of traffic to be measured is also a factor to be considered.

In order to base the remuneration of Administrations* on a uniformly recommended traffic unit, it is desirable to recommend the use of *one* of the four units listed above.

What unit should be recommended in the light of the technical equipment required for measurement and the volume of traffic to be taken into account?

Question 3/II — International accounting between Administrations * for collect calls or credit-card calls

The introduction of the new system for establishing accounts in conformity with Recommendation E.250 has made it necessary to study this question.

Establishing accounts presents no difficulty in the case of two-way circuits the cost of which is shared by the two terminal Administrations.

Methods must, however, be decided upon for the case when each Administration * pays for all the circuits and equipment used for its outgoing traffic and the Administration * in the country of destination collects the charges for collect calls or credit-card calls.

* or recognized private operating Agencies.

Question 4/II — Revision of the Recommendations in Series E relating to international accounts

Note 1. — The provisions for the establishment of international telephone accounts are presented as parts of several Recommendations and there are some discrepancies between Recommendations. A general review of all Series E Recommendations is therefore necessary with a view to preparing a single Recommendation incorporating all provisions relating to the procedures that are acceptable in establishing international accounts for both continental and intercontinental telephone traffic.

Note 2. — A partial list of items to be considered is contained in section 5 of Contribution COM II —No. 58 (pages 97 to 104), period 1964-1968.

Question 5/II — Revision of the Recommendations on international programme and television transmissions

The present Recommendations:

E.330 (formerly E.57) (International programme transmissions),

E.331 (formerly E.57*bis*) (Intercontinental programme transmissions),

E.350 (formerly E.58) (International television transmissions),

E.351 (Intercontinental television transmissions by satellite),

need to be reviewed in the light of the rapid development of programme and television transmission in general and particularly of transmissions via satellites. When a sufficiently stable position has been reached new Recommendations of general application should be drafted covering:

i) sound programme transmissions,

ii) television transmissions.

Note 1. — The terminology used in these present Recommendations should be checked.

Note 2. — The Study Group II working party concerned will get in touch with the study groups from which information is needed, in particular Study Group XV and the C.M.T.T.

Question 6/II — International calls between three or more stations located in two or more countries (conference or multiple calls)

What recommendations should be formulated to facilitate the provision of multiple (conference) calls? Consideration should be given to the following points:

1. What facilities should be provided for customers on a conference call and should there be any limitations?

2. What specifications should be provided for conference connecting arrangements at outgoing, intermediate or incoming points to provide satisfactory transmission to two or more circuits or stations and what should the transmission limitations be to ensure that all parties on a conference call can converse with each other properly?

3. What operating practices and procedures should be prescribed so that the outgoing operator can establish a conference call expeditiously using a minimum number of telephone circuits?

4. What rates should be established for conference calls and how should the revenues be allocated between Administrations?

5. What method should be adopted for establishing accounts?

Note. — This question also concerns Study Groups IV, XI and XIII.

ANNEX
(to Question 6/II)

In the period 1964-1968 Study Group II investigated Question 9/II, which was limited to calls to two or more persons at the same called telephone. However, in Recommendation E.232 (formerly E.56), the *Instructions for the international telephone service*, and the *Instructions for the intercontinental telephone service* mention " multiple (conference) calls ". An international conference call is a call established between three or more stations located in two or more countries.

As conference calls are a regular service offered in North America, conference connecting arrangements are provided in many of the long-distance switchboards in North America. There is a continuing requirement, and there are frequent requests for conference calls from the United States to other countries. Such calls are now handled where possible. However, since no uniform procedures are provided, this has led to wasteful use of circuits and a certain amount of confusion. This problem is considerably broader than merely the practices to be followed by operators in establishing such calls, and the method of making the announcement to the various parties to the conversation.

The requirements for the design of conference connecting arrangements for use at switchboards at intermediate and incoming points have to be studied, transmission design limitations must be established for such a multi-point network, rates have to be adopted for use in charging the customer, and procedures for settlement of accounts have to be decided.

Question 7/II — Requests for information on foreign numbers

One of the consequences of the steady expansion of the fully automatic international telephone service is a substantial increase in the volume of enquiries concerning the numbers of foreign subscribers. The present practice of looking up the telephone numbers in foreign telephone directories presents more and more drawbacks and is inadequate for present and future requirements.

Is it advisable to recommend that information on the telephone numbers of foreign subscribers should be requested directly by telephone from the country of destination, i.e.:

a) either from a *single* central international enquiry service in the country of destination;
b) or from a local national enquiry service in the country of destination?

ANNEX
(to Question 7/II)

1. Experience shows that telephone directories are out of date as soon as they are published.

2. Telephone directories are not amended after publication.

3. Pending the publication of a new telephone directory—generally after a period of one year—many entries are wrong. Consequently, the information given by employees on the basis of these directories is often misleading.

4. Research carried out in the Federal Republic of Germany shows that, in about 20% of all cases, the information desired cannot be found in foreign directories but has to be obtained from a service in the foreign country itself.

5. Looking up subscribers' telephone numbers in foreign telephone directories takes far too much time.

6. The layouts of telephone directories in the various countries are based on such different principles that only trained (over-specialized) operators can cope with the task.

These considerable disadvantages, which hamper the smooth running of the international telephone service, can be remedied by arranging for requests for information on telephone numbers to be submitted directly to the directory enquiries services of the country of destination, as is already the case with telephone traffic between various European countries and the United States of America and Canada; this method has already proved its worth. It may be desirable for the subscriber requesting the information to remain on the line as he is often in a position to lend prompt and effective assistance because of his knowledge of the languages involved and local conditions.

Preliminary studies so far carried out by the German Administration indicate that the use of international telephone circuits for enquiry purposes is fully justifiable economically, particularly as direct telephoning to an enquiry service in the country of destination guarantees the accuracy of the information supplied.

If this method were adopted, the exchange of telephone directories between Administrations could be reduced substantially.

When this question is studied, account will have to be taken of the micro-filmcard method employed by certain Administrations at the present time: microcards with up to-date information on telephone subscribers are exchanged at frequent intervals. Use of this method has considerably reduced the number of incorrect replies to enquiries attributable to out-of-date telephone directories. All aspects of the problem will have to be carefully studied, however, to ascertain whether this method is preferable to telephoning the enquiries service in the country of destination, and if so under what conditions.

Question 8/II — Standardization of call tickets

In the new *Instructions for the international telephone service* two different methods of making collect calls are described:

1. the method whereby the chargeable duration is determined in the outgoing country,
2. the method whereby the chargeable duration is determined in the incoming country.

With the first method it is usual in the case of most calls for the outgoing country to send fully completed tickets to the incoming country, after which call charges are debited to the incoming country.

In practice, this method gives rise to difficulties because the tickets used in different countries vary in form. As a rule, differences in size present no difficulties, but differences in form do have a disadvantage particularly if the tickets in question have to be used in an automated accounting system in the incoming country. In such cases, detailed explanations have to be given individually for each outgoing country.

In these circumstances, it seems desirable to study the possibility of some standardization of the form of call tickets used in different countries.

In some other cases where the first method is used, data are sent to the incoming country in lists. Standardization of these lists also seems highly desirable.

Question 9/II — Arrangements for the payment for public service telephone calls by persons travelling abroad

What special facilities could be applied, or
what new facilities could be devised
to enable members of the public, when travelling outside their country of residence, to make telephone calls within the country they are visiting or from that country to other countries without having to pay for the calls on the spot?

Note. — In studying the additional facilities that might be afforded, the need to safeguard against fraudulent practices will have to be borne in mind.

Question 10/II — Revision of the "Instructions for the international telephone service"

(question of a continuing nature)

Note. — The procedure for the provisional adoption of Recommendations between two Plenary Assemblies could be applied to this revision.

Question 11/II — Preparation of instructions for users of the international automatic service

During the preparation of the draft Instructions for the International Telephone Service, some Administrations * expressed the view that, apart from the new Instructions, a separate booklet giving information about the international automatic service should be specially prepared for the benefit of users in all countries.

Note. — The main human factors affecting users in the automatic telephone service are being studied by the Study Group II working party which has taken over from the Working Party on Human Factors set up by Study Group XIII during the period 1964-1968.

* or recognized private operating Agencies.

Question 12/II — Telephone Regulations

What amendments and additions to C.C.I.T.T. Recommendations are required in order that they may fully implement the general principles suggested by the C.C.I.T.T. for retention in a revision of the Telephone Regulations?

Question 13/II — Determination of the number of circuits as a function of the traffic in manual operation. Revision of Recommendation E.510 (formerly E.91) and preparation of new Recommendations on this point, if required

Note. — The reasons for the submission of this Question are given in the following annex.

ANNEX
(to Question 13/II)

1. As stated in the footnote on page 194 of Volume II of the *Blue Book* [1], Recommendation E.510 (formerly E.91) dates from the XIIIth Plenary Meeting of the C.C.I.F. in London in 1946, and has not been revised since. It was issued as the outcome of a question raised in 1939 concerning the principles by which the number of long-distance circuits required in the demand telephone service should be determined. Tables A and B are more or less the tables which were used in the United States in 1940.

As stated above, they are used chiefly as reference tables for the developing countries. Table B was incorporated in the Manual on *National Automatic Networks* published by the C.C.I.T.T. as a basis for calculating the number of circuits in manual operation (see Chapter VII, page 11, of the Manual).

It will be noted that, whenever the number of circuits is equal to 4, Table B corresponds to a uniform holding time of 54 minutes on any circuit in the busy hour.

2. If Recommendation E.510 (formerly E.91) has to be revised, it could be simplified by relating the number of circuits to be provided in a relation not to the holding time in the busy hour, which is often difficult to determine, but to the traffic handled by the circuit.

This type of data is suggested by the C.C.I.T.T. Plan Committee for the planning of networks.

According to the Plan Committee documents, telephone circuit requirements are assessed as follows:

— 150 minutes of chargeable call per day require the establishment of a telephone circuit;

— an additional circuit is provided for each increase of 150 chargeable minutes per day;

— however, if Administrations * have sufficient statistical data to draw up more accurate forecasts on the basis of Erlang tables, these data should be used.

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[1] This note also appears, in Volume II-A of the *White Book*.

* or recognized private operating Agencies.

It should be noted that the above criteria are not, strictly speaking, the subject of any C.C.I.T.T. Recommendation.

Question 14/II — Programme of study of human factors in customer international dialling

Considering

the importance of customer human factors in the continuing studies by the C.C.I.T.T. to implement present Recommendations for the automatic world-wide network:

— What variables in this network should be studied from the viewpoint of customer human factors such as procedural and dialling errors, speed of dialling and acceptability to users?

— What uniform study programmes and procedures should be undertaken to obtain significant, experimental and statistical evidence on these customer human factors?

Note. — See Annexes 1 to 4 below, which reproduce the proposals made by Working Party XIII/4 at Tokyo (1967) and Geneva (1968).

ANNEX 1
(to Question 14/II)

Studies relating to human factors considered by the C.C.I.T.T.

(Table prepared by Working Party XIII/4 at Tokyo, July 1967)

Item	Degree of urgency [1]	Subject	Type of study	Participants
A		INFORMATION REQUIRED PRIOR TO DIALLING		
A.1	3	Obtaining the telephone number	Field	Sweden
A.2	1	Format of telephone number	Laboratory	Belgium Netherlands Sweden United Kingdom U.S.A. (A.T.T.)
A.3	2	Instructions for national customers	Laboratory	Netherlands United Kingdom
			Field	Belgium Sweden
A.4	2	Instructions for foreign visitors	Laboratory	United Kingdom U.S.A. (A.T.T.)
			Field	Belgium Japan Sweden
B		PROCEDURE DURING DIALLING		
B.1	1	Customer dialling behaviour	Field	Belgium Canada (Tel. Assoc.) Sweden United Kingdom
B.2	1	Conditions affecting customer dialling	Laboratory	Japan Sweden United Kingdom U.S.A. (A.T.T.)
			Field	Belgium Sweden
B.3	3	Overall time limits on dialling	Field	Canada (Tel. Assoc.)

[1] "1" is most urgent.

Item	Degree of urgency [1]	Subject	Type of study	Participants
C		OPERATION OF THE TELEPHONE SYSTEM		
C.1	1	Interpretation of audible tones	Laboratory	Australia France F. R. of Germany Japan Netherlands Spain Sweden United Kingdom U.S.A. (A.T.T.)
C.2	3	Effect of circuit busy conditions	Field	Sweden
C.3	2	Subsequent customer attempts following busy conditions	Field	Sweden
C.4	2	Call progress information	Field	Sweden
C.5	3	Differences between international and national dialling	Field	Canada (Tel. Assoc.) Sweden United Kingdom
C.6	2	Transmission quality	Field	Sweden United Kingdom
C.7	3	Language difficulties	Laboratory Field	Canada (Tel. Assoc.) Sweden United Kingdom
C.8	2	Acceptance of international automatic working	Field	Belgium Canada (Tel. Assoc.) Sweden United Kingdom U.S.A. (A.T.T.)

[1] "1" is most urgent.

ANNEX 2
(to Question 14/II)

Questionnaire for national subscribers dialling international calls

(Draft prepared by Working Party XIII/4 at Geneva in May 1968)

Interviewed by visit ☐
telephone ☐

Code		*YES*	*NO*
1.0	1. Do you dial international calls direct to other countries yourself?	☐	☐
1.1	(If no)—ask why not and after answer terminate interview. (If yes)—proceed to questions below.		

IN REGARD TO THE *LAST* INTERNATIONAL CALL YOU DIALLED:

2.0	2. What country did you dial direct?		
3.0	3. Can you give me the town or telephone number you dialled?		
	a) was the call to a private number?	☐	☐
	b) was the call to a company?	☐	☐
	c) did you indial into a PBX?	☐	☐
4.0	4. How long ago?		
4.1	— less than 24 hours ☐		
4.2	— one to seven days ☐		
4.3	— more than seven days ☐		
5.0	5. Did you have any difficulty in obtaining the telephone number for this call?	☐	☐

		International prefix	Country code	Trunk code	Subscriber number
5.1	Where did you get the number?				
5.1.1	— official telephone directory	☐	☐	☐	☐
5.1.2	— special (pre-printed) telephone directory	☐	☐	☐	☐
5.1.3	— personal list	☐	☐	☐	☐
5.1.4	— letterhead	☐	☐	☐	☐
5.1.5	— information operator	☐	☐	☐	☐
5.1.6	— friends or business associates	☐	☐	☐	☐
5.1.7	— memory	☐	☐	☐	☐
5.1.8	— other (specify)				

Code			*YES*	*NO*
6.0	6.	Did you have any difficulty in knowing how to make the international call?	☐	☐
		(If yes) — what difficulty?		
6.1		— knowing the international prefix ☐		
6.2		— knowing the country code ☐		
6.3		— knowing the trunk code ☐		
6.4		— knowing whether the addressee's number can be dialled ☐		
6.5		— trunk prefix wrongly included ☐		
6.6		— other (specify)		
7.0	7.	a) Did you have to dial the international number more than once?	☐	☐
		(If yes)—why?		
7.1		— Could not understand or was unsure of the tone or voice announcement received. (If this item is marked proceed to b, c, d, and e below.) ☐		If any of these items are marked, leave out b, c, d, e and proceed to f.
7.2		— dialled incorrectly ☐		
7.3		— busy tone; engaged ☐		
7.4		— no reply; no answer ☐		
7.5		— hear nothing after dialling ☐		
7.6		— other (specify)		
7.7		b) Did you hear:		
7.8		— a tone ☐		
7.9		— a voice announcement ☐		
7.10		— both ☐		
7.11		c) Did the tone and/or announcement come in		
7.12		— during dialling ☐		
7.13		— after dialling ☐		
7.14		d) Could you describe the tone or tell me what the announcement said?		
7.15		e) What did you decide to do when you heard that tone and/or voice announcement?		
7.16		— dialled again ☐		
7.17		— called operator ☐		
7.18		— other (specify)		
7.19		f) How long did you wait before dialling again?		
7.20		— less than one minute ☐		
7.21		— one to five minutes ☐		
7.22		— more than five minutes ☐		

Code		*YES*	*NO*
8.0	8. Did the person who answered use a language you did not understand?	☐	☐
	(If yes)—What did you do about it?		
8.1	— disconnected and dialled operator ☐		
8.2	— flashed operator ☐		
8.3	— dialled again later ☐		
8.4	— other (specify)		
9.0	9. Which of these four words comes closest to describing the quality of the connection during conversation?		
9.1	— excellent ☐		
9.2	— good ☐		
9.3	— fair ☐		
9.4	— poor ☐		
10.0	10. Did you or the person you were talking to have any difficulty in talking or hearing over that connection? (If answer is " yes " probe for nature of difficulty, but *without* suggesting possible types of difficulty and copy down answers verbatim; e.g. " Could you describe the difficulty a little more? ")	☐	☐
	(At end of the interview, categorize the answers in terms of the items below):		
10.1	— low volume ☐		
10.2	— noise or hum ☐		
10.3	— distortion ☐		
10.4	— variations in level, cutting on and off ☐		
10.5	— crosstalk ☐		
10.6	— echo ☐		
10.7	— complete cut off ☐		
10.8	— other (describe)		
	COULD YOU GIVE THE FOLLOWING *ADDITIONAL INFORMATION*:		
11.0	11. Type of telephone set used:		
11.1	— rotary dial ☐		
11.2	— push-button ☐		
11.3	— repertory dialler ☐		
11.4	— coin box ☐		
11.5	— loudspeaking telephone ☐		
12.0	12. Approximately how many international calls do you make per month?		
12.1	— 1 or less ☐		
12.2	— 2 to 5 ☐		

Code

12.3 — 6 to 10 ☐

12.4 — 11 or more ☐

13.0 13. a) How many different countries did you call during the preceding month?

13.1 b) Approximately how many different international numbers do you call?

13.2 — 1 to 5 ☐

13.3 — 6 to 10 ☐

13.4 — 11 to 19 ☐

13.5 — 20 or more ☐

14.0 14. Are there any other comments you would like to make about international subscriber dialling?

15.0 15. Which or what do you find most difficult in dialling international calls?

16.0 16. Are you:

YES

16.1 a) a business subscriber ☐

If yes

16.2 i) the person in a firm mainly responsible for telecommunications ☐

16.3 ii) the PBX operator ☐

16.4 iii) an extension user other than i) ☐

YES

16.5 b) a residential subscriber ☐

16.6 c) other user (specify)

ANNEX 3
(to Question 14/II)

FORM A

Questionnaire for visitors from other countries dialling national calls [1]

(To be given only after the visitor has been in the country long enough to have made several calls)

Code		*YES*	*NO*
1.0	Did you yourself dial any telephone calls in this country?	☐	☐
	(If no) ask why not and terminate interview		
1.1	Did not know how to make a call	☐	☐
1.2	No need to dial any call	☐	☐
1.3	My calls were all placed by somebody else	☐	☐
1.4	Other reasons		
2.0	On your *first few calls* did you experience any difficulty? (If no) proceed to Question 4	☐	☐
2.1	What difficulties?		
2.1.1	Finding the number (describe)		
2.1.2	Knowing how to dial the number (describe)		
2.1.3	Understanding audible tones or announcements (describe)		
2.1.4	Hearing and talking (describe)		
	(At end of the interview, categorize the answers to 2.1.4 in terms of the items below):		
2.1.4.1	— low volume	☐	
2.1.4.2	— noise or hum	☐	
2.1.4.3	— distorsion	☐	
2.1.4.4	— variation in level, cutting on and off	☐	
2.1.4.5	— crosstalk	☐	
2.1.4.6	— echo	☐	
2.1.4.7	— complete cut off	☐	
2.1.4.8	— other (describe)	☐	
2.1.5	Other (describe)		

[1] Questionnaire prepared by Working Party XIII/4 in Geneva, May 1968.

Code			*YES*	*NO*
3.0	Did you learn to overcome these difficulties?		☐	☐
	(If yes) after how many calls?			
3.1	— 1 to 5	☐		
3.2	— 6 to 10	☐		
3.3	— 11 or more	☐		
4.0	Have you used a coin telephone?		☐	☐
4.1	(If yes) did you have any difficulty in knowing how to use it? (If yes, probe non-directively to determine the nature of the difficulty.)		☐	☐
5.0	Did you ever use a directory to look up a number or for information on the use of the telephone?		☐	☐
5.1	Number	☐		
5.2	Information	☐		
5.3	(If yes) did you have any difficulty in finding what you wanted? (If yes, probe non-directively to determine the nature of the difficulty.)		☐	☐
6.0	Are there any other comments or suggestions you would like to make about the telephone service in this country?			
7.0	Was this visit the first time you had experience with this country's telephone system?		☐	☐
8.0	Approximately how many calls did you make during this visit?			
8.1	— 1	☐		
8.2	— 2 to 5	☐		
8.3	— 6 to 10	☐		
8.4	— 11 or more	☐		
9.0	In what country do you live?			
9.1	In what country do you make most of your telephone calls?			
10.0	Have you visited our country before?		☐	☐
10.1	— first time	☐		
10.2	— 2 to 5 times	☐		
10.3	— more than 5 times	☐		

ANNEX 4
(to Question 14/II)

FORM B

Questionnaire for visitors from other countries dialling national calls [1]

(To be given after visitor's first call in the country)

Code

1.0 In what country do you live?

1.1 In what country do you make most telephone calls?

Then ask the following questions concerning the call just dialled (exclude calls within a P.B.X.):

2.0 Was the call (if visitor is uncertain whether a national call was a local or a trunk call, interviewer should determine category from location of called number)

2.1 a national call? local ☐

2.2 trunk ☐

2.3 an international call? ☐ what country?

3.0 Did you dial the call

3.1 a) yourself? ☐
b) via an operator? ☐
If b) omit questions 6 and 7.

4.0 Where did you get the number?

4.1 — official telephone directory ☐
4.2 — special (pre-printed) telephone directory ☐
4.3 — personal list ☐
4.4 — letterhead ☐
4.5 — information operator ☐
4.6 — friends or business associates ☐
4.7 — memory ☐
4.8 — other (specify)

		YES	*NO*
5.0	Did you have any difficulty in knowing how to make the call? (If yes)—what difficulty?	☐	☐
5.1	knowing the international prefix	☐	
5.2	knowing the country code	☐	
5.3	knowing the trunk code	☐	

[1] Questionnaire prepared by Working Party XIII/4 in Geneva in May 1968.

Code

5.4 knowing whether the addressee's number can be dialled ☐

5.5 trunk prefix wrongly included ☐

5.6 obtaining information for addressee's number ☐

5.7 other (specify)

		YES	*NO*
6.0	a) Did you have to dial the international number more than once? (If yes)—Why?	☐	☐

6.1 — Could not understand or was unsure of the tone, voice announcement received. (If this item is marked, proceed to b, c, d, and e, below.) ☐

6.2 — dialled incorrectly ☐

6.3 — busy tone; engaged ☐

6.4 — no reply; no answer ☐

6.5 — hear nothing after dialling ☐

6.6 — other (specify)

If any of these items are marked, leave out b, c, d and e and proceed to f.

6.7 b) Did you hear:

6.8 — a tone or signal ☐

6.9 — a voice announcement ☐

6.10 — both ☐

6.11 c) Did the tone and/or announcement come in

6.12 — during dialling ☐

6.13 — after dialling ☐

6.14 d) Could you describe the tone or tell me what the announcement said?

6.15 e) What did you decide to do when you heard that tone signal and/or voice announcement?

6.16 — dialled again ☐

6.17 — called operator ☐

6.18 — other (specify)

6.19 f) How long did you wait before dialling again?

6.20 — less than one minute ☐

6.21 — one to five minutes ☐

6.22 — more than five minutes ☐

		YES	*NO*
7.0	Did the person who answered use a language you did not understand? (If yes)—What did you do about it?	☐	☐

Code

7.1 — disconnected and called the operator ☐
7.2 — flashed the operator ☐
7.3 — dialled again later ☐
7.4 — other (specify)

8.0 Which of these four words comes closest to describing the quality of the connection during conversation?

8.1 — excellent ☐
8.2 — good ☐
8.3 — fair ☐
8.4 — poor ☐

9.0 Did you or the person you were talking to have any difficulty in talking or hearing over that connection? (If answer is " yes " probe for nature of difficulty, but *without* suggesting possible types of difficulty and copy down answers (verbatim) e.g., " Could you describe the difficulty a little more? "

YES *NO*
☐ ☐

(At end of the interview, categorize the answers in terms of the items below):

9.1 — low volume ☐
9.2 — noise or hum ☐
9.3 — distortion ☐
9.4 — variations in level, cutting on and off ☐
9.5 — crosstalk ☐
9.6 — echo ☐
9.7 — complete cut off ☐
9.8 — other (describe)

COULD YOU GIVE THE FOLLOWING *ADDITIONAL INFORMATION*:

YES *NO*

10.0 Was this call made from a coin telephone? ☐ ☐

10.1 a) If yes, describe any difficulties you had in knowing how to use the coin telephone and then proceed to Question 12.

10.2 b) If no, proceed to Question 11 below.

11.0 Have you used a coin-box telephone in this country? ☐ ☐

11.1 (If yes)—Did you have any difficulty? ☐ ☐

11.2 (If so)—specify

12.0 Are there any other comments you would like to make about the telephone service in this country?

Question 15/II — Possible customer confusion in interpreting the audible tones encountered in fully automatic working in the international service

Considering

1. the great variation in national audible tones, particularly ringing and busy (engaged);

2. the need for more uniformity in tones on international circuits for automatic observing equipment;

what steps should be taken to minimize subscriber confusion with tones?

Note. — See annex below, which reports on the results of laboratory tests on confusion between tones.

ANNEX
(to Question 15/II)

Risk of confusing tones

1. Table 1 shows the results of early laboratory studies carried out uniformly in eight countries on confusion between tones by inexperienced users without the help of any special instructions or tone recordings. This level of confusion is probably typical of the majority of customers, who will dial internationally only infrequently, and is commercially unacceptable.

2. In the case of ringing tone in Table 1, customer confusion is shown by the deviation of the percentage figures below 100%. For busy tone, the confusion is shown by the deviation above 0%. The data shown for the French transfer tone and C.C.I.T.T. special tone cannot be adequately interpreted from Table 1. It can also be shown that:

i) the French transfer tone has a high probability of being interpreted as busy by foreign calling customers, thereby defeating its main purpose;

ii) the C.C.I.T.T. special tone is regarded as " peculiar " thereby achieving its purpose in encouraging the calling customer to seek operator assistance.

3. Other laboratory studies also tested customer interpretation of an extensive range of other possible tones derived from various combinations of frequency (Hz), modulation rate, repetition period and ratio of tone-on to tone-off.

It was shown that, of the four tone characteristics studied, most customers seem to depend more heavily on repetition period and modulation to differentiate between ringing tone and busy tone.

Frequency and on-off ratio seem to be relatively unimportant. The parameter of distinctive pattern in the tone used in a few Administrations (e.g. Australia and United Kingdom) was not studied; customers accustomed to such patterns may consider patterning to be an important characteristic.

4. It is apparent that the results of 3 and 4 above may have implications for a possible future review of Recommendation Q.35 (Recommendation E.180). Hence the urgency for field confirmation. It is recognized that any change in the ringing or busy tones by an Administration must not only be designed to help the customer calling from a foreign country but should not produce confusion for its own national customers; the change should also minimize the expense of introduction.

5. Studies carried out after the laboratory studies referred to in paragraph 1 have indicated that it should be possible to avoid most of the confusion by providing simple written instructions.

TABLE 1

Percentage of experimental subjects judging tone as " ringing "

	Tone	U.S.A.	U.K.	F.R. of Germany	Netherlands	Japan	Sweden	Spain	Australia
Ringing tones	U.S.A. — Ring (future)	97	85	97	100	100	100	100	97
	German — Ring (future)	81	37	100	100	75	100	100	38
	United Kingdom	55	100	74	69	50	63	37	100
	Japan	91	90	100	94	100	100	97	100
	U.S.S.R., France, Netherlands	87	42	94	100	69	100	100	44
Busy tones	U.S.A. — Busy	0	58	4	0	0	0	0	26
	U.S.A. — Congestion (future)	3	30	0	0	9	0	0	6
	U.S.A. — Busy (future)	0	33	4	0	0	7	0	19
Special tones	France — (Transfer)	6	18	4	13	34	3	0	3
	C.C.I.T.T. special tone	44	53	29	38	56	33	48	38

Question 16/II — Customer dialling performance in fully automatic working in the international network

Considering the expectation of customer difficulties in dialling calls on international circuits.

— What are the sources of difficulty and what can be done to reduce them ?

— What should be done to provide a continuing check on and measure of the quality of dialling performance ?

Note 1. — Both the questionnaire methods outlined in Annexes 2, 3 and 4 of Question 14/II, and the service observing procedure shown in Table 1 of Recommendation Q.61, Volume VI, (E.422, Volume II-A), are applicable to the study of this question.

Note 2. — Present data, while still very limited, suggest: a) that customer dialling irregularities on international circuits will significantly exceed those on the national network, and b) that dialling performance of frequent callers like business subscribers improves after the introduction of fully automatic working, whereas performance of infrequent callers like residence subscribers does not.

Question 17/II — Standardization of the use and printing of the new symbols and separators in national and international telephone numbers

Considering

a) the confusion for customer international dialling which now exists between countries in that one symbol is used for many different functions and the same function may be served by different symbols;

b) the increased confusion which could arise in the future with the growing need for additional symbols for user dialling and subscriber-to-subscriber signalling for purposes of computer interaction and data entry,

what symbols and separators should be recommended for the use and printing of symbols and separators in national and international telephone numbers ?

ANNEX 1
(to Question 17/II)

Results of a preliminary study to define the symbols and separators to be recommended for printing national and international telephone numbers

1. *General*

1.1 The statements below apply specifically to the printing of national and international telephone numbers on letterheads, business cards, bills, etc. It is desirable that directory printing should conform as far as possible.

1.2 The international number should be printed below the national number.

1.3 The word " telephone " in the appropriate language should be placed to the left of or above the national or international number (to avoid confusion with other letterhead numbers).

Example:

Telephone	national	(0607)	123 4567
	international	+22 607	123 4567

2. *Classes of symbols*

There are four classes of symbol in national or international numbers. No symbol should be used in more than one class, nor should any symbol within a class have more than one meaning.

There classes are:

— diallable symbols (in French: *symboles de composition du numéro*);
— procedural symbols (in French: *symboles opératoires*);
— information symbols (in French: *symboles d'information*);
— spacing symbols (in French: *symboles d'espacement*).

3. *Diallable symbols*

A *diallable* symbol is a symbol which is to be dialled and appears on a telephone set to designate either a finger-hole of a dial or a push-button of a keyset. These symbols can be digits, letters, or other signs [1].

4. *Procedural symbols*

A *procedural* symbol is a symbol which tells the subscriber how to dial, e.g. the parentheses ( ) enclosing a trunk code have been used to indicate to the customer that he should not dial the trunk code for calls within his numbering area. Such symbols should not appear in a finger-hole or on a push-button and therefore are not to be dialled.

4.1 The *international prefix symbol* should be + (plus) and should precede the country code in the international number. It would serve to remind a customer to dial the international prefix and would also serve to identify the number following as the international telephone number.

4.2 The symbol ( ) (parentheses) should be used to indicate that the digits within the ( ) *are not always dialled.*

The ( ) should enclose the trunk prefix and trunk code in a national number, to remind the user never to dial the enclosed digits from telephones within the numbering area but always to dial them from telephones outside the area. It should not be used in an international number. Administrations which publish trunk codes for each individual subscriber in telephone directories should have the option of using a — (hyphen) between the trunk code and subscriber number as a substitute for ( ).

4.3 Further study is required to recommend an international symbol to denote an *extension number.* Provisionally, it is suggested that an abbreviation of the word extension, e.g., ext., in the appropriate language be typed or printed after the subscriber number followed by the appropriate digits.

4.4 For subscribers with multiple numbers and automatic search, only the main number should be printed, without any symbol to denote the existence of the multiple numbers.

4.5 For a subscriber who does not have automatic search, the symbol / (oblique stroke, slash or slant) should be used to separate alternate numbers. Where the alternate numbers are consecutive, only the last digit should be shown for the alternate numbers. Where the alternate numbers are not consecutive, but are within the same exchange, the digits after the exchange code should be shown for the alternate numbers.

Example [2]: (0607) 123 4567/8/9
(0607) 123 4567/4512/4580
(0607) 123 4567/6059/0074

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[1] Further study is required to propose recommendations regarding other signs as diallable symbols. In the interim it should be noted that certain Administrations are currently using the symbols * and # as diallable symbols for the eleventh and twelfth (X and Y) buttons of a push-button telephone set. It is therefore suggested that * and # should not be used as procedural, information, or spacing symbols.

[2] For brevity, the examples shown are for national numbers only. For international numbers add the prefix + and the country code.

The general use of / is to indicate a *choice in dialling*. It may therefore also be used to indicate a choice of prefix codes as, for example, the choice of person-to-person or station-to-station dialling.

4.6 When it is desired to show that a subscriber number is an *indialling* number of a PBX, the symbol : (colon) should be placed in the space immediately preceding the extension digits.

Example: (0607) 256 : 4567

5. *Information symbols*

An *information* symbol is a symbol associated with the subscriber number describing special features of the subscriber telephone service, e.g., the symbol ⌀, where used, indicates that the subscriber has an answering device attached to his telephone (reference should be made to Volume II-A, *White Book*, Recommendation E.202, Items 2.a and 2.b. Such symbols are not to be dialled and therefore should not appear in a finger-hole or on a push-button, nor can such symbols be procedural in instructing the subscriber how to dial.

Information symbols should be associated with the word " telephone ". To avoid confusion in dialling, they should not appear either as prefixes or suffixes to the telephone number.

Example: Telephone (0607) 123 4567 or Telephone ⌀
⌀ (0607) 123 4567

6. *Spacing symbols*

Spacing symbols are symbols which are used solely to separate parts of a telephone number from each other. They cannot be diallable, procedural, or information symbols.

Grouping of digits in a telephone number should be accomplished by means of spaces unless an agreed explicit symbol (e.g., parentheses or hyphen) is necessary for procedural purposes. For reasons of cost, Administrations using dots or dashes as separators may require an extended period of time to discontinue these in directories.

The *major separation* among digits in a telephone number should occur between trunk code and subscriber number. This separation should therefore always be wider than any other separation within the number.

If, in the international number, there is need for grouping of digits prior to the subscriber number, the spacing shall occur between the country code and the trunk code.

DOCUMENTARY PART

SUPPLEMENTS

SUPPLEMENT No. 1

TABLE OF THE ERLANG LOSS FORMULA

(Erlang No. 1 formula, also called Erlang B formula)

Loss probabilities: 1%, 3%, 5%, 7%.

let p = the loss probability
y = the traffic offered (in erlangs)
n = the number of circuits

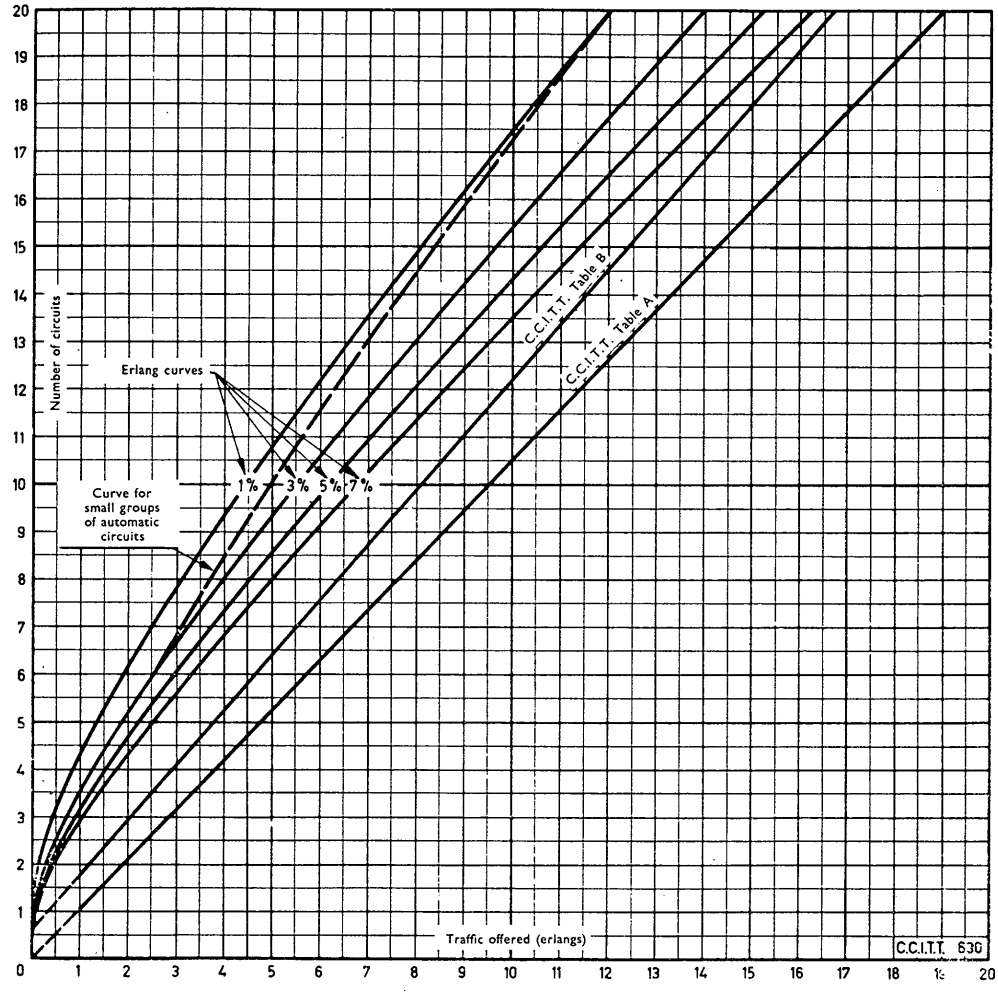
Formula:

$$E_1 n(y) = p = \frac{\frac{y^n}{n!}}{1 + \frac{y}{1} + \frac{y^2}{2!} + \ldots + \frac{y^n}{n!}}$$

n	p = 1%	p = 3%	p = 5%	p = 7%	n	p = 1%	p = 3%	p = 5%	p = 7%
1	0.01	0.03	0.05	0.08	51	38.80	42.89	45.53	47.72
2	0.15	0.28	0.38	0.47	52	39.70	43.85	46.53	48.76
3	0.46	0.72	0.90	1.06	53	40.60	44.81	47.53	49.79
4	0.87	1.26	1.53	1.75	54	41.50	45.78	48.54	50.83
5	1.36	1.88	2.22	2.50	55	42.41	46.74	49.54	51.86
6	1.91	2.54	2.96	3.30	56	43.31	47.70	50.54	52.90
7	2.50	3.25	3.74	4.14	57	44.22	48.67	51.55	53.94
8	3.13	3.99	4.54	5.00	58	45.13	49.63	52.55	54.98
9	3.78	4.75	5.37	5.88	59	46.04	50.60	53.56	56.02
10	4.46	5.53	6.22	6.78	60	46.95	51.57	54.57	57.06
11	5.16	6.33	7.08	7.69	61	47.86	52.54	55.57	58.10
12	5.88	7.14	7.95	8.61	62	48.77	53.51	53.58	59.14
13	6.61	7.97	8.84	9.54	63	49.69	54.48	57.59	60.18
14	7.35	8.80	9.73	10.48	64	50.60	55.45	58.60	61.22
15	8.11	9.65	10.63	11.43	65	51.52	56.42	59.61	62.27
16	8.88	10.51	11.54	12.39	66	52.44	57.39	60.62	63.31
17	9.65	11.37	12.46	13.35	67	53.35	58.37	61.63	64.35
18	10.44	12.24	13.39	14.32	68	45.27	59.34	62.64	65.40
19	11.23	13.11	14.31	15.29	69	55.19	60.32	63.65	66.44
20	12.03	14.00	15.25	16.27	70	56.11	61.29	64.67	67.49
21	12.84	14.89	16.19	17.25	71	57.03	62.27	65.68	68.53
22	13.65	15.78	17.13	18.24	72	57.96	63.24	66.69	69.58
23	14.47	16.68	18.08	19.23	73	58.88	64.22	67.71	70.62
24	15.29	17.58	19.03	20.22	74	59.80	65.20	68.72	71.67
25	16.13	18.48	19.99	21.21	75	60.73	66.18	69.74	72.72
26	16.96	19.39	20.94	22.21	76	61.65	67.16	70.75	73.77
27	17.80	20.31	21.90	23.21	77	62.58	68.14	71.77	74.81
28	18.64	21.22	22.87	24.22	78	63.51	69.12	72.79	75.86
29	19.49	22.14	23.83	25.22	79	64.43	70.10	73.80	76.91
30	20.34	23.06	24.80	26.23	80	65.36	71.08	74.82	77.96
31	21.19	23.99	25.77	27.24	81	66.29	72.06	75.84	79.01
32	22.05	24.91	26.75	28.25	82	67.22	73.04	76.86	80.06
33	22.91	25.84	27.72	29.26	83	68.15	74.02	77.87	81.11
34	23.77	26.78	28.70	30.28	84	69.08	75.01	78.89	82.16
35	24.64	27.71	29.68	31.29	85	70.02	75.99	79.91	83.21
36	25.51	28.65	30.66	32.31	86	70.95	76.97	80.93	84.26
37	26.38	29.59	31.64	33.33	87	71.88	77.96	81.95	85.31
38	27.25	30.53	32.62	34.35	88	72.81	78.94	82.97	86.36
39	28.13	31.47	33.61	35.37	89	73.75	79.93	83.99	87.41
40	29.01	32.41	34.60	36.40	90	74.68	80.91	85.01	88.46
41	29.89	33.36	35.58	37.42	91	75.62	81.90	86.04	89.52
42	30.77	34.30	36.57	38.45	92	76.56	82.89	87.06	90.57
43	31.66	35.25	37.57	39.47	93	77.49	83.87	88.08	91.62
44	32.54	36.20	38.56	40.50	94	78.43	84.86	89.10	92.67
45	33.43	37.16	39.55	41.53	95	79.37	85.85	90.12	93.73
46	34.32	38.11	40.54	42.56	96	80.31	86.84	91.15	94.78
47	35.22	39.06	41.54	43.59	97	81.24	87.83	92.17	95.83
48	36.11	40.02	42.54	44.62	98	82.18	88.82	93.19	96.89
49	37.00	40.98	43.53	45.65	99	83.12	89.80	94.22	97.94
50	37.90	41.93	44.53	46.69	100	84.06	90.79	95.24	98.99

SUPPLEMENT No. 2

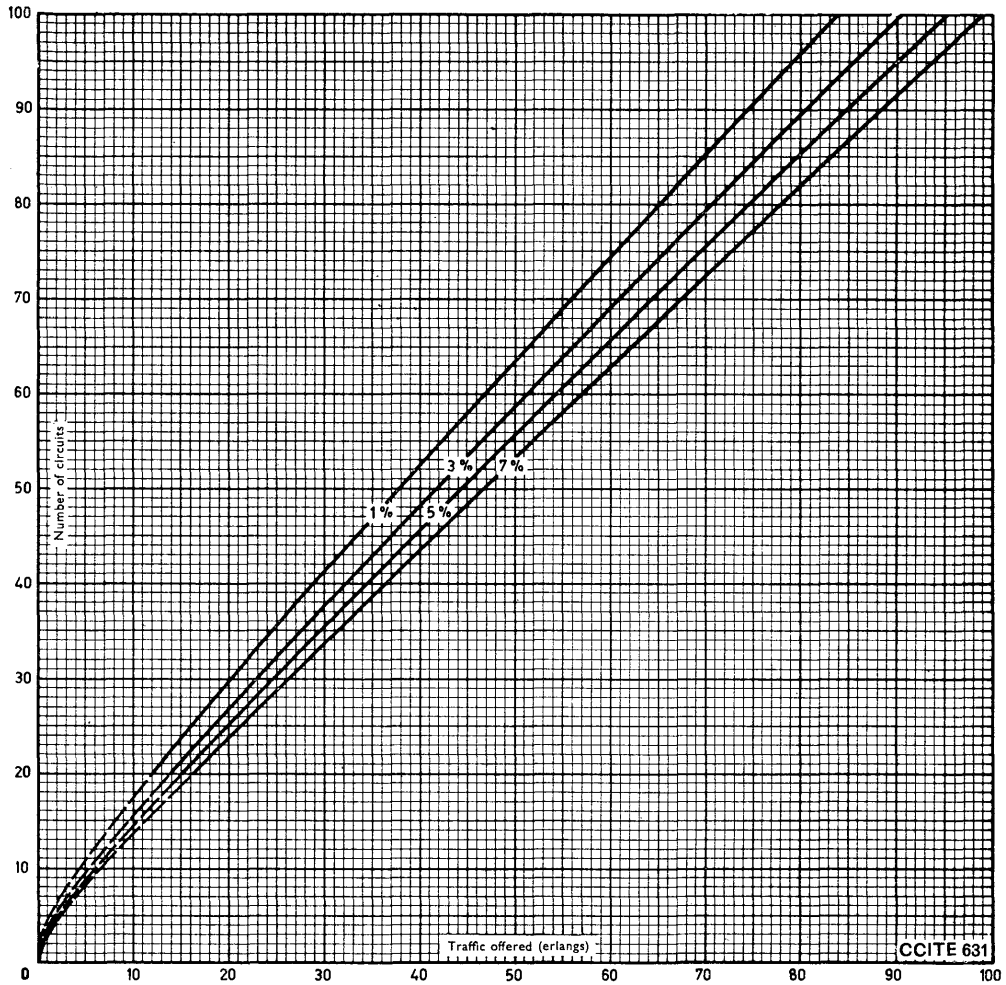
CURVES SHOWING THE RELATION BETWEEN THE TRAFFIC OFFERED AND THE NUMBER OF CIRCUITS REQUIRED



Relation between the traffic (in erlangs) offered and the number of circuits required in the case of:

- the C.C.I.T.T. Tables A and B (Recommendation E.510 and Q.85)
- the Erlang formula (p = 1%, 3%, 5% and 7%)
- the curve for small groups of automatic circuits (see Annex to Recommendation E.520 and Q.87)

FIGURE 1. — **Number of circuits between 1 and 20**



Relation between the traffic (in erlangs) offered and the number of circuits required in the case of the Erlang formula for (p = 1%, 3%, 5% and 7%)

FIGURE 2. — **Number of circuits between 1 and 100**