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# ITU-T U.11

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## TELEGRAPH SWITCHING

## SPECIFIC SIGNALLING SCHEMES AND INTERWORKING BETWEEN SIGNALLING SYSTEMS

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# TELEX AND GENTEX SIGNALLING ON INTERCONTINENTAL CIRCUITS USED FOR INTERCONTINENTAL AUTOMATIC TRANSIT TRAFFIC (TYPE C SIGNALLING)

## ITU-T Recommendation U.11

(Previously "CCITT Recommendation")

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## FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation U.11 was revised by the ITU-T Study Group IX (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

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NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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# TELEX AND GENTEX SIGNALLING ON INTERCONTINENTAL CIRCUITS USED FOR INTERCONTINENTAL AUTOMATIC TRANSIT TRAFFIC (TYPE C SIGNALLING)

*(Geneva, 1964; amended at Mar del Plata, 1968; Geneva, 1972, 1976; Malaga–Torremolinos, 1984; Melbourne, 1988 and Helsinki, 1993)*

The CCITT,

*considering*

(a) that it is necessary to standardize an intercontinental signalling system to be used between intercontinental transit centres as the present standard systems A and B, in the limits of CCITT Recommendations, do not comply with all the requirements of an intercontinental signalling system;

(b) that the intercontinental links that are used and could be used in the future for telex and gentex operation use various transmission systems, including not only the standard voice-frequency telegraph channels – normally used in the continental field – but also 7-unit error-proof multiplex systems over radio circuits and 6-unit or 5-unit multiplex systems over VFT channels. Other transmission systems will perhaps be used in the future. Therefore, it seems necessary that the intercontinental signalling system should be suitable for as wide a variety of transmission systems as possible;

(c) that this signalling system must enable the channels to be operated on a both-way basis. This type of operation can produce collisions; therefore it was noted that the intercontinental signalling system must provide for limiting collisions, or at least for simple facilities to detect head-on collisions and for taking appropriate action after their detection;

(d) that another important feature of the intercontinental signalling system should concern the automatic testing of the ability of the multiplex equipment to transmit teleprinter characters, before establishing a call to the distant subscriber, through an intercontinental transit centre. The class-of-traffic signal, the class-of-traffic-check signal, and the transmission–confirmation signal in the form proposed can provide an efficient and simple method of meeting this requirement. The signals provided also check the functioning of the FRXD when used. It is important that the correct class-of-traffic and class-of-traffic-check signals be transmitted for the required category;

(e) that the use of teleprinter characters, for selection information and other signalling functions, appears to be most advantageous, as they can be transmitted over the error-proof radio circuits, which undoubtedly will be part of the intercontinental transit network;

(f) that it is emphasized that the signals, in the form proposed, simplify interconnection of the intercontinental transit network to the terminal networks in the outgoing and in the incoming countries;

(g) that as regards the method of transmission of selection information, it has been decided that the selection by complete block will be adopted on intercontinental routes. Under this arrangement, the telex destination code and the national number of the called subscriber will be signalled as a single group of characters without awaiting backward path signals. There may be some advantage with regard to reducing the occupancy of intercontinental trunks and equipment and in preventing the mutilation of signals if the complete group of selection signals is assembled, preferably by the originating country, before commencing to route the call. However, the retransmission of selection signals from one switching centre to the next may start even before the block has been completely received;

(h) that exemption from selection by complete block is permissible for manual testing of intercontinental links. The receiving centre should take account of this and also of the fact that calls via an error–proof multiplex radio channel may prevent selection signals' being received as a complete block;

(i) that interworking requirements between signalling standards according to U.1 (types A and B), U.11 (type C) and U.12 (type D) have been defined in Recommendation U.15 (interworking rules),

*unanimously declares the view*

**1** The signalling system between two intercontinental transit centres will be as described in Table 1.

NOTE 1 – In this Recommendation:

X denotes the intercontinental transit centre that originates the call under consideration on the intercontinental circuit;

Y denotes the intercontinental transit centre that receives the call considered on the intercontinental circuit.

Both the forward and backward path signals are described at the moment of their emission on the intercontinental circuit. It should be noted that the signals in Tables 1, 2 and 3 are those transmitted by the switching equipment, irrespective of the type of transmission used for the intercontinental trunk circuit. It is possible that the teleprinter signals, although transmitted at automatic speed, may be delayed or separated by periods of stop polarity after transmission via multiplex systems and that the original periods of start and stop polarity may be either lengthened or shortened by the incidence of error-correction on radio circuits.

The circuits between X and Y may transmit calls in both directions.

NOTE 2 – For the description of the combinations of International Telegraph Alphabet No. 2, see Table 1/S.13 [1] or the Recommendation cited in [2].

**2** For bothway working circuits used in the intercontinental transit network, the following action to minimize the incidence of head-on-collision is recommended.

At opposite ends of a group of bothway trunk circuits, either inverse order testing should be adopted or a close approximation to it by testing the route in smaller groups of circuits in a fixed order starting the search from the same initial position.

That calls should be offered in such a way that each circuit is tested once only for the minimum period of time necessary to ascertain whether it is free or busy, and the switching equipment should not have facilities for delayed searching.

A head-on collision is provisionally assumed if centre X receives combination No. 20 (100 ms pulse of polarity A) instead of combination No. 22 (40 ms pulse of polarity A). When this combination No. 20 has been detected, centre X checks receipt of the second combination No. 20 to establish whether a head-on collision or a signal mutilation due to faulty transmission has occurred. During this time, centre X continues signalling towards centre Y, until both combinations No. 20 of the calling signal have been transmitted. The clearing signal is then sent and the trunk is released.

When a head-on collision has been assumed upon receipt of a single combination No. 20, the switching equipment may make another attempt to select a free circuit either on the same group of circuits or on a group of overflow circuits, if they exist. In the event of a further head-on collision on the recall, or on the call attempt via the overflow route, no further recall will be made and the call will be cleared down after returning the transit failure signal.

Should the second combination No. 20 not have arrived in the five seconds following the commencement of receipt of the first combination No. 20, centre X will put into operation the automatic retest procedure on the circuit concerned.

**3** There is no need to distinguish on a circuit XY whether a call is to terminate in centre Y or if it is to pass in transit via Y to a country other than the country (or network) of Y. The advantage of not having to transmit on circuit XY the digits of the destination code in the case of a call termination in Y is offset by the complication of the registers and the necessity for an additional discrimination in the class-of-traffic signal.

**4** The transit centre will be provided with an identification code consisting of seven characters, of which the uniform format is:

- combination No. 29;
- either one letter combination and combination No. 29 or two letter combinations designating the transit Administration;
- combination No. 30;
- a one-, two- or three-digit number identifying the centre and/or equipment in the transit Administration's network.

If the numerical portion of the transit centre identification code comprises one or two digits, two or one combinations No. 30 should be added to maintain the seven-character format. The letter (or two letters) designating the transit Administration shall be the letter (or two letters) of the telex network identification code as far as possible. In interworking cases the numeric portion may be replaced by combinations No. 30 to maintain the seven character format.

The transit centre identification code will be returned automatically in all cases and will continue as far as the calling country. If several transit centres are involved in setting up a call, the calling network will receive the codes of these transit centres one after the other. This information is useful for retracing the route followed by a call (for traffic statistics, international accounts and the clearing of faults).

**5** To simplify the solution of problems raised by overflow (increased congestion of systems, risk that the call may return back to the original exchange) overflow for each call will be allowed at only one centre.

NOTE – The rigour of this rule could be eased by admitting alternative (2nd choice) routings in certain traffic relations. This question will be discussed when the routing plans are established.

**6** A transit centre will have to be advised:

1) that an incoming call is:

   a) a telex call (between telex subscribers),

   b) a gentex call (between gentex stations),

   c) a call, generally originating from a switchboard operator or from maintenance staff, to a manual switchboard or service point. This class-of-traffic signal is to be used if signalling conditions for calls to manual switchboards or other service points in the destination network are different from those returned on calls to subscribers,

   d) a special category call (see 7.1 and 7.2 below);

2) that the call concerned has already been subjected to overflow.

Other possibilities must be reserved, such as routing via telegraph circuits for 100 or 200 bauds, and a reserve supply of class-of-traffic signals has been envisaged to this end.

## 7 Class-of-traffic signal

**7.1** The class-of-traffic signals are divided into two categories:

– *Category A* – Signals for transmission at 50 bauds, the utilization of which is allocated as shown in Tables 4 and 5.

– *Category B* – Signals reserved to meet future uses, not yet defined, such as use of circuits for more than 50 bauds.

**7.1.1** The signals of category A are characterized by Z polarity of the first element; the signals under category B are characterized by A polarity of the first element.

**7.1.2** For category A signals the second and third elements are associated to discriminate the four following categories: telex, gentex, service traffic and a special category (see Note under 7.2).

**7.1.3** For the signals of category A as well as for those of category B, the polarity of the fourth element indicates whether or not the call has already been overflowed.

**7.1.4** For the signals of category A as well as for those of category B, the fifth element must always have an A polarity in order to avoid the use as a class-of-traffic (COT) signal of the special signals, combination No. 20 (calling signal) and combination No. 30 (special pre-signal).

**7.2** Table 5 indicates the combinations used for class-of-traffic and class-of-traffic-check signals.

NOTE – For 50-baud transmissions during which an alphabet with a non-5-unit code could be used, to avoid routing through time-division multiplex channels see the Recommendation cited S.15 [3].

**7.3** The class-of-traffic combination for a previously alternatively routed call shall be inserted by the switching equipment in the centre at which overflow occurs.

**8** The ability of the forward signalling path of the trunk to transmit 5-unit signals is checked by using complementary class-of-traffic and class-of-traffic-check (COTC) signals. The two combinations of the transmission-confirmation signal are also complementary and provide a similar check of the backward signalling path. Failure to receive the reception-confirmation and transmission-confirmation signals correctly within 5 seconds from the start of the calling signal, or receipt of the transmission-failure signal, should initiate the automatic retest signal on the circuit concerned.

**9** The equipment of centre Y should preferably begin the forward selection as soon as the first digit of the called number has been registered, but in the case of 2-digit destination codes forward selection may be postponed until the second digit of the called number has been registered. In the case of interworking to signalling according to Recommendation U.12 (type D) standard, additional rules for timing of outgoing seizure and forwarding selection are given in Recommendation U.15.

If D1, D2 and D3 are the destination code digits of the called country (or network), and if N1, N2, N3, etc., are the digits of the called number, on any intercontinental circuit XY the sequence of selection signals, including those for calls terminating in the country Y, will be as follows:

*Case of a called country having a 2-digit destination code*

Class-of-traffic

Class-of-traffic check

D1
D2
N1
→ } start of
N2 } forward
→ } selection
N3
.
.
N*n*

Combination No. 26

*Case of a called country having a 3-digit destination code*

Class-of-traffic

Class-of-traffic check

D1
D2
D3
N1
→ (start of forward selection)
N2
.
.
N*n*

Combination No. 26

The maximum number of digits to be expected in the sum of the destination code and national number is 12.

## 10 Retest signal

**10.1** The automatic retest signal should be initiated on the circuit concerned as indicated in clauses 2 and 8 above, another attempt to select a circuit should be made (once only) and, if unsuccessful, the transit failure signal should be returned to the preceding exchange. The circuit should be marked *unavailable* for outgoing traffic and the retest signal should be transmitted over the forward signalling path as shown in Table 1.

**10.2** The circuit should be tested up to five times at nominal intervals of 1.0 or 1.2 minutes and a check should be made to confirm the receipt of backward path signals up to and including the transmission-confirmation signal in response to each test. If a valid transmission-confirmation signal has not been received at the end of this first group of tests, the retest will continue with a further group of up to five tests at either 5.0/6.0- or 30/36-minute intervals. If 5.0- or 6.0-minute intervals are used and a valid transmission-confirmation signal has not been received at the end of this second group of tests, a further group of up to nominally five retests will be made at 30- or 36-minute intervals. An alarm will be given at an appropriate time. However, this retest procedure may be discontinued at any stage at the discretion of the outgoing Administration.

**10.3** If, however, during the above sequence of retests a valid transmission-confirmation signal is received, a clearing signal shall be transmitted in the place of the retest signal. Following a valid clear-confirmation signal, the incoming and the outgoing sides of the trunk circuit should not be returned to service until after expiry of the appropriate guard delay time.

**10.4** In order to cater for the possibility that a faulty circuit may be seized at both ends, the automatic retest equipment should be arranged to allow an incoming call to be received during the start polarity period of the automatic retest signals. Administrations may however ignore such calls which occur during the incoming guard delay period.

**10.5** Where an exchange has knowledge of a transmission system failure, it is desirable that retest signals shall not be applied to the circuits affected.

**10.6** The intervals between the tests at the two ends of the trunk route should be made different to be sure that successive retests do not overlap at both ends. In general, the intercontinental transit centre having the higher F.69 [4] telex destination code should take the longer interval (i.e. 1.2, 6 and 36 minutes). Nevertheless, when this requirement would entail considerable difficulty, alternative arrangements may be adopted by agreement between the two Administrations concerned.

**11** A guard delay of 1 second will be maintained during which incoming calls will not be accepted, and a guard delay of 2 seconds will be maintained during which outgoing calls will not be offered, from the moment when start polarity appears on both signalling paths. This start polarity should be maintained throughout the guard period, on both signalling paths of the international circuit.

Where modern electronic switching equipment is used at both ends of a circuit, the above figures for incoming and outgoing guard delay periods may be reduced to 0.5 and 1 second respectively.

NOTE – In the case of error-corrected radiotelegraph systems the guard period should be measured from the moment that the appropriate number of $\alpha$ signals has been transmitted and received in accordance with 8.3/U.20.

**12** The receiving equipment congestion signal should be returned on not more than 0.4% of calls in the busy hour and the equipment should ensure that this signal is returned only when receiving equipment congestion is positively identified, and not in the case of a fault in the register access equipment.

Receipt of a receiving equipment congestion signal by a transit centre either on the first attempt or after a single recall (either on the same route or on an alternative route) should cause the transit failure signal to be returned to the calling network.

**13** The incoming equipment should be arranged to maintain start polarity on the backward path if the first character of the selection signal is spurious as indicated either by a character other than a class-of-traffic signal or the pre-signal combination No. 30 (see Note to Table 2).

The incoming equipment may release the connection if any of the consecutive combinations of the calling and selection signals is delayed for five or more seconds. In this case the transit failure signal should be returned after the reception confirmation, the transmission confirmation and transit centre identification code signals; and be followed by the clearing signal.

An Administration may release the connection or recall if the transit centre identification code from the next transit centre has not been returned within three seconds after the receipt of the transmission confirmation signal.

**14** The normal time (i.e. without taking account of the supplementary delay which could be introduced by operation of ARQ equipment) required to switch through a transit centre measured from the beginning of the receipt of the calling signal to the offering of the calling signal on the outgoing route varies from 1200 to 1500 milliseconds (according to the number of digits to be examined), plus the time required to position the selectors. (This time is independent of the transmission delay of the transmission system.) The time required to position the selectors should not exceed 800 milliseconds.

**15** For signalling purposes on international circuits that will be used between the international exchange of the terminal country and an intercontinental transit centre, several solutions are available to the Administrations concerned. The choice between the solutions must be the subject of agreement between the terminal country and the country handling the intercontinental transit. These solutions will result from the following considerations:

a) Whether the routing towards the intercontinental transit centre (or from the intercontinental transit centre) would be made through the continental centre adjacent to the intercontinental transit centre in the transit country (in this case the access prefix 00 should be used).

b) Alternatively, whether the routing would be made directly from the international terminal centre towards the intercontinental centre and vice versa.

c) Whether the international circuits between the terminal country and the transit country would be operated only as outgoing or incoming circuits or whether it would be possible to operate them in both directions for setting up calls.

d) Whether the signalling system on these circuits would be the one that is used for automatic traffic between the terminal country and the transit country, the transit country being responsible for making the conversion of this signalling system according to type C, Table 1 signals on the intercontinental circuits and vice versa.

e) Alternatively, whether this signalling would be established according to type C signalling.

f) It is permitted to transmit over the intercontinental transit network the digits of the called station number (except the first one or two digits) as and when received from the calling subscriber. It is to be noted, however, that in that case backward path signals may be received by the calling subscriber or operator during his selection. This may prevent correct printing of the forward and backward path signals and even lead to mutilation of the forward selection signals. This difficulty, as well as unnecessary loading of the intercontinental transit network by selection faults and slow selection can be avoided by assembling the subscriber's selection information, preferably in the originating network.

To give some guidance to Administrations, Tables 2 and 3 below have been set up. Table 2 corresponds to the case of access to the intercontinental transit centre through the adjacent continental centre. Table 3 corresponds to the case of direct access to the intercontinental transit centre with unidirectional circuits. In the case of direct access to the intercontinental transit centre using both-way circuits, type C signalling indicated in Table 1 could be applied.

TABLE 1/U.11

**Signalling between the two intercontinental transit centres**

| Signal or function | Forward path (X towards Y) | Backward path (Y towards X) | Remarks |
|---|---|---|---|
| Free line | Start polarity (polarity A) | Start polarity (polarity A) | |
| Call | Stop polarity (polarity Z) for 150-300 ms followed by 2 combinations No. 20 (2 polarity A pulses of 100 ms duration) and then followed by the selection signals | | The Y incoming register must be connected and ready to receive selection signals within 425 ms of the commencement of the inversion to stop polarity; the combinations No. 20 do not need to be detected as part of the signal for calling purposes.<br><br>The Y register must be able to absorb any combination No. 20 or portion of a combination No. 20 that may precede the selection signals.<br><br>Note 1 – It is necessary for the transmission system to be capable of transmitting the combinations No. 20 of the calling signal before reception of the reception-confirmation signal. In the case of error-corrected radio circuits the radio equipment must ensure that the period of the stop polarity preceding the first combination No. 20 is transmitted as four consecutive ß signals, and that at the Y end the inversion to stop polarity is transmitted when two consecutive ß signals have been received. The radio equipment at the Y end must also ensure that the first combination No. 20 is preceded by at least 140 ms of stop polarity. |
| Reception confirmation | | Stop polarity followed by combination No. 22 (40-ms pulse of A polarity) | Stop polarity is returned 450 ms (± 10%) after the end of receipt of the class-of-traffic signal. Combination No. 22 is returned 450 ms (± 10%) after the inversion to stop polarity on the backward path. |
| Selection signals | Class-of-traffic signal<br>Class-of-traffic check signals<br>The 2 or 3 digits of the destination code of the called country<br>The digits of the called station number<br>Combination No. 26 | | These signals are transmitted immediately after the calling signal, without awaiting the reception at X of the reception confirmation.<br><br>These signals are transmitted according to the code of International Telegraph Alphabet No. 2 at the normal modulation rate of 50 bauds; the digits of the destination code and the first two digits of the called station are transmitted at automatic speed [clause 15 f)]. |
| Transmission confirmation | | Combination No. 29 (20-ms pulse of A polarity)<br>Combination No. 32 (120-ms pulse of A polarity) | Transmitted after the reception-confirmation signal on condition that the class-of-traffic check signal has been correctly received.<br><br>This signal and the reception-confirmation signal will have to be absorbed by the switching equipment of X and should not be able to go through that equipment to arrive at the preceding centre. |

TABLE 1/U.11 *(continued)*

**Signalling between the two intercontinental transit centres**

| Signal or function | Forward path (X towards Y) | Backward path (Y towards X) | Remarks |
|---|---|---|---|
| Transit centre identification | | Combination No. 29 Either 1 letter and Combination No. 29 or 2 letters to identify transit centre Y Combination No. 30 1, 2 or 3 digits followed by 2, 1 or 0 combinations No. 30 respectively (clause 4) | Teleprinter signals immediately following the transmission-confirmation signal at automatic speed. These signals must go through centre X and arrive at the originating country. |
| Call-connected | | Combination No. 32 (120-ms pulse of A polarity) followed by 8 combinations No. 29 (20-ms pulses of A polarity) transmitted at automatic speed | As soon as it is possible, at the last transit centre, to discriminate that the signal received is the call-connected signal from the destination network, it should be returned immediately to the calling network, in type C format, by the last transit centre.<br><br>In the case of type A signalling in the destination network the format of the type C call-connected signal is either:<br><br>*a)* combination No. 32 and 8 combinations No. 29 transmitted at automatic speed but then preceded by the type A call-connected signal (150 ms ± 11 ms) followed by 150-300 ms stop polarity, or<br><br>*b)* combination No. 32 followed by 0-300 ms stop polarity and 8 combinations No. 29 transmitted at automatic speed.<br><br>In the case of type B signalling in the destination network the format of the type C call-connected signal will always be combination No. 32 and 8 combinations No. 29 transmitted at automatic speed.<br><br>In the event of non-receipt of a call-connected or service signal from the destination network within 60 seconds of the transmission of the end-of-selection signal, the last transit centre will return an appropriate service signal and release the connection. Non-receipt of the call-connected or service signal at the first transit centre within approximately 60 seconds of transmission of the end-of-selection signal will cause this transit centre to return the NC service signal and release the connection. |
| Changed address interception signals | | Teleprinter signals sent from the called system i)<br>NCH plus Clearing signal | This is *not* preceded by the call-connected signal (clause 10/U.1). |
| | | ii)<br>NCH: xxxxx ← ≡ plus Clearing signal | These signals are preceded by the call-connected signal (clause 1/U.41).<br><br>NOTE 2 – In some networks, this may be used in conjunction with call redirection. |

TABLE 1/U.11 *(continued)*

**Signalling between the two intercontinental transit centres**

| Signal or function | Forward path (X towards Y) | Backward path (Y towards X) | Remarks |
|---|---|---|---|
| Call redirection signals | | Teleprinter signals<br>i)<br>RDI: xxxxx←≡<br>(Rec. U.41)<br>ii)<br>RDI | These signals will always be preceded by a call connected signal. No clearing signal is sent after RDI.<br><br>The answer-back signals of the number to which the call has been redirected is in accordance with the procedures on answer-back signals shown below. |
| Answer-back signals | | | Where the destination systems returns the answer-back automatically, the answer-back and any associated signals (e.g. date and time) should be extended to the calling network as and when received.<br><br>Where the destination system does not return the answer-back automatically, the last transit centre in the connection will make a request for the return of the answer-back code of the obtained teleprinter. |
| Teleprinter service signals for ineffective calls, or waiting signals originating at centre Y | | Teleprinter signals conforming to 10.1/U.1 and<br>10.2/U.1 and<br>Recommendation U.41 | |
| Teleprinter service signals from type A or B systems | | Teleprinter signals as returned from the called system, followed by the clearing signal | |
| Service signals from type D systems in CSC | | Convert to service signals in Rec. U.1 format, coded as in Table 7b/U.12 | |
| Non-printing service signals from type B systems<br><br>*a)* Spare line of permanent start polarity | | Combination No. 27<br>Combination No. 28<br>Combination No. 31<br>Combination No. 29<br>Combination No. 4 (**D**)<br>Combination No. 5 (**E**)<br>Combination No. 18 (**R**)<br>Combination No. 27<br>Combination No. 28<br>followed by the clearing signal | These signals *a), b)* or *c)* should be transmitted by the last transit centre in the connection.<br><br>In order to reduce the ineffective time of trunk circuits to a minimum the service signal in *a)* should be returned not later than 15 sec. from the end of the last selection signal transmitted to the terminal system and in *c)* should be returned within 6 sec. from the inversion to stop polarity from the terminal system. |

TABLE 1/U.11 *(continued)*

**Signalling between the two intercontinental transit centres**

| Signal or function | Forward path (X towards Y) | Backward path (Y towards X) | Remarks |
|---|---|---|---|
| *b)* Busy or similar signals | | Combination No. 27<br>Combination No. 28<br>Combination No. 31<br>Combination No. 29<br>Combination No. 15 (**O**)<br>Combination No. 3 (**C**)<br>Combination No. 3 (**C**)<br>Combination No. 27<br>Combination No. 28<br>followed by the clearing signal | |
| *c)* Station faulty permanent stop polarity | | Combination No. 27<br>Combination No. 28<br>Combination No. 31<br>Combination No. 29<br>Combination No. 4 (**D**)<br>Combination No. 5 (**E**)<br>Combination No. 18 (**R**)<br>Combination No. 27<br>Combination No. 28<br>followed by the clearing signal | |
| Idle circuit | Stop polarity | Stop polarity | |
| Clearing | Inversion to continuous start polarity in the direction of clearing | | The recognition time for this signal is 450 ± 150 ms. |
| Clear confirmation | Inversion to continuous start polarity in the opposite direction within 500 ± 100 ms of the commencement of the clearing signal. | | |
| Automatic re-test | Stop polarity for 300 ms<br>Combination No. 20<br>Combination No. 20<br>Combination No. 21<br>Combination No. 15<br>Combination No. 16<br>Combination No. 16<br>Combination No. 16<br>Stop polarity for 2 seconds<br>Start polarity for 1.0 or 1.2 minutes<br>5 or 6 minutes<br>30 or 36 minutes<br>(repeated; see clause 10) | | 3 combinations No. 16 correspond to a spare destination code 000, allocated for re-test purposes.<br><br>1.0, 5 and 30 minute periods of start polarity for one centre.<br><br>1.2, 6 and 36 minute periods of start polarity for the other centre.<br><br>The automatic re-test signal is initiated:<br><br>– in the case of a head-on collision, on failure to receive the second combination No. 20,<br><br>– or on failure to receive the reception-confirmation and transmission-confirmation signals correctly,<br><br>– or on receipt of the transmission failure signal.<br><br>NOTE 3 – Tolerance on all timings is ± 10%. |

TABLE 1/U.11 *(concluded)*

**Signalling between the two intercontinental transit centres**

| Signal or function | Forward path (X towards Y) | Backward path (Y towards X) | Remarks |
|---|---|---|---|
| Receiving equipment congestion | | Stop polarity for 450 ms followed by the clearing signal | This signal is returned not more than 500 ms after the start of the calling signal when there is no receiving equipment free to be connected to receive the selection signals within 425 ms of the start of the calling signal.<br><br>This signal will have to be absorbed by the switching equipment at X and should not be able to go through that equipment to arrive at the preceding centre. |
| Transit failure | | Combination No. 27<br>Combination No. 28<br>Combination No. 31<br>Combination No. 29<br>Combination No. 14 (**N**)<br>Combination No. 3 (**C**)<br>Combination No. 27<br>Combination No. 28<br>followed by clearing signal | This signal is returned as soon as possible following the transit centre identification code signal:<br><br>*a)* when there is no free trunk outgoing from transit centre;<br><br>*b)* when the three digits following the class-of-traffic check signal do not correspond to an allocated code;<br><br>*c)* any of the consecutive incoming Y selection signals is delayed for 5 seconds or more;<br><br>*d)* when a call fails owing to a head-on collision;<br><br>*e)* when the class-of-traffic signal received does not correspond to an authorized type of call, or<br><br>*f)* when the receiving equipment congestion signal is received from another transit centre. |
| Transmission failure | | Combination No. 15<br>Combination No. 15 (two 80-ms pulses of A polarity) followed by clearing signal | Returned after the reception-confirmation signal as soon as the class-of-traffic check signal has been found to be incorrect.<br><br>This signal and the reception-confirmation signal will have to be absorbed by the switching equipment of X and should not be able to go through that equipment to arrive at the preceding centre. |

TABLE 2/U.11

**Signalling between the calling international system and the intercontinental transit system (using code 00 for access via the international exchange of the transit Administration)**

<table>
<tr><th>Function</th><th>Forward path</th><th>Backward path</th><th>Remarks</th></tr>
<tr><td>Call</td><td></td><td></td><td rowspan="4">These are signalled in accordance with the type of signalling used on terminal calls into the national system of the transit Administration</td></tr>
<tr><td>Call confirmation</td><td></td><td></td></tr>
<tr><td>Proceed-to-select</td><td></td><td></td></tr>
<tr><td>Selection</td><td>Digit 00</td><td></td></tr>
<tr><td>Transit proceed-to-select</td><td></td><td>Stop polarity for at least 450 ms followed by combination No. 22 (40-ms pulse of A polarity)</td><td rowspan="6">In the case where the transit Administration uses type A signalling for terminal calls to its national network, the inversion to stop polarity on the backward signalling path takes place when the incoming trunk circuit is seized. Where the transit system uses type B signal-ling for this traffic the inversion to stop polarity on the backward signalling path occurs after the transit access code digits 00 have been selected. The transit access code is selected in accordance with the same signalling arran-gements as those used for the terminal traffic into the national network.</td></tr>
<tr><td>Signal selection[a)]</td><td>Combination No. 30<br>Class–of–trafic<br>2 or 3 digit destination code<br>Digits of called number<br>Combination No. 26</td><td></td></tr>
<tr><td>Transit centre identification code signals</td><td></td><td>As in Table 1. Returned within 150 ms of recognition of the class-of-traffic signal (or the end-of-selection signal if the method using assembling of selection signals is adopted [clause 15 f)</td></tr>
<tr><td>Call connected</td><td></td><td>As in Table 1</td></tr>
<tr><td>Service signals</td><td></td><td>As in Table 1</td></tr>
<tr><td>Clear</td><td></td><td></td><td rowspan="2">These are signalled in accordance with the type of signalling used on terminal calls into the national system of the transit Administration.</td></tr>
<tr><td>Clear confirmation</td><td></td><td></td></tr>
<tr><td colspan="4">a) The pre-signal combination No. 30 indicates a call without class-of-traffic check facilities, which are considered unnecessary for circuits of this type.</td></tr>
</table>

TABLE 3/U.11

**Signalling between the calling international system and the first transit exchange (when access to this is by direct connection to the transit switching equipment)**

| Function | Forward path | Backward path | Remarks |
|---|---|---|---|
| Free line | As in Table 1 | | |
| Call | Inversion to stop polarity for 450 ms | | The incoming register must be connected and ready to receive selection signals within 425 ms of the commencement of the inversion to stop polarity. |
| Reception confirmation | | As in Table 1 | |
| Selection signals | As in Tables 1 and 2 | | As in Table 1 |
| Transmission confirmation | | Combination No. 29 (20-ms pulse of A polarity) Combination No. 32 (120-ms pulse of A polarity) | Transmitted only on receipt of selection signals in accordance with Table 1/U.11 and then as soon as the class-of-traffic check combination has been correctly received. |
| Transit centre identification code signals | | As in Table 1 | |
| Call connected | | As in Table 1 | |
| Service signals | | As in Table 1 | |
| Idle circuit | As in Table 1 | | |
| Clearing | As in Table 1 | | |
| Clear confirmation | As in Table 1 | | |
| Automatic re-test | As in Table 1 | | As in Table 1 |
| Backward busy | As in Table 1 | | |
| Receiving equipment congestion | | As in Table 1 | |
| Transit failure | | As in Table 1 | |
| Transmission failure | | As in Table 1 | |

NOTES

1 Working over these circuits is on a unidirectional basis and there is therefore no requirement for the inclusion of combinations No. 20 in the calling agent.

2 In the case of both-way working the use of the signalling system of Table 1 is recommended.

TABLE 4/U.11

**Class-of-traffic signals**

| Category | Element number | | | | | Condition signalled |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| A | Z | | | | | Category A (50 bauds) |
| B | A | | | | | Category B (reserved) |
| A | | A | A | | | Special category (Note under 7.2) |
| A | | A | Z | | | Gentex |
| A | | Z | A | | | Service traffic |
| A | | Z | Z | | | Telex |
| A and B | | | | A | | Not previously overflowed |
| A and B | | | | Z | | Previously overflowed |
| A and B | | | | | A | Permanent polarity |

TABLE 5/U.11

**Combinations used for class-of-traffic and class-of-traffic check signals**

| Category | Class-of-traffic | | | | | | Class-of-traffic check | | | | | | Function | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | combination number | Element number | | | | | combination number | Element number | | | | | Gentex, telex, telex and gentec, combined or special category | Previously alternatively routed (overflowed) |
| | | 1 | 2 | 3 | 4 | 5 | | 1 | 2 | 3 | 4 | 5 | | |
| A | 11 | Z | Z | Z | Z | A | 20 | A | A | A | A | Z | Telex | Yes |
| | 21 | Z | Z | Z | A | A | 15 | A | A | A | Z | Z | | No |
| | 10 | Z | Z | A | Z | A | 8 | A | A | Z | A | Z | Service traffic | Yes |
| | 1 | Z | Z | A | A | A | 13 | A | A | Z | Z | Z | | No |
| | 6 | Z | A | Z | Z | A | 12 | A | Z | A | A | Z | Gentex | Yes |
| | 19 | Z | A | Z | A | A | 7 | A | Z | A | Z | Z | | No |
| | 4 | Z | A | A | Z | A | 16 | A | Z | Z | A | Z | Special category (Note under 7.2) | Yes |
| | 5 | Z | A | A | A | A | 22 | A | Z | Z | Z | Z | | No |
| B | 3 | A | Z | Z | Z | A | 26 | Z | A | A | A | Z | | Yes |
| | 9 | A | Z | Z | A | A | 2 | Z | A | A | Z | Z | | No |
| | 18 | A | Z | A | Z | A | 25 | Z | A | Z | A | Z | | Yes |
| | 28 | A | Z | A | A | A | 24 | Z | A | Z | Z | Z | | No |
| | 14 | A | A | Z | Z | A | 23 | Z | Z | A | A | Z | | Yes |
| | 31 | A | A | Z | A | A | 30 | Z | Z | A | Z | Z | | No |
| | 27 | A | A | A | Z | A | 17 | Z | Z | Z | A | Z | | Yes |
| | 32 | A | A | A | A | A | 29 | Z | Z | Z | Z | Z | | No |

## References


[1] CCITT Recommendation Use on radio circuis of 7–unit synchronous systems giving error correction by automatic repetition, Rec. S.13, Table 1/S.13.

[2] CCITT Recommendation Operational provisions for the international public telegram service, Rec. F.1, Division C, No. 8.

[3] CCITT Recommendation Use of the telex network for data transmission at 50 bauds, Rec. S.15, (clause 2).

[4] CCITT Recommendation Plan for telex destination codes, Rec. F.69.