The drawings contained in this Recommendation have been done in Autocad

ANNEX B

(to Recommendation T.70)

B.1 *State tables*

The state tables:

B—1/T.70: Transport connection establishment, calling side

B—2/T.70: Transport connection establishment, called side

B—3/T.70: Data phase (symmetrical protocol)

present the transitions of the transport protocol in a table form in contrast to the diagram form to be seen in Annex A. While the diagrams are useful to overview the protocol mechanism the appropriate tables give clear information of which event is possible in which state and which actions are to be performed. Moreover each of the events and conditions is combined with a shortening in brackets (e.g.: E 5) which is a pointer to the 2nd part of this annex, so that the reader of these tables can easily come to know which meaning a certain event, action or condition has.

An impossible event related to a certain state can be recognized by an empty field in the crossing—point of the state and the event.

B.2 *Lists of events, actions and conditions*

The lists of events (Table B—4/T.70), actions (Table B—5/T.70) and conditions (Table B—6/T.70) intend to care for detailed explanations and clarification related to the protocol components (events, actions and conditions) found in the diagrams and tables.

All the components in the tables are accompanied by a list number (e.g. E 1, A 10, C 3, etc.) which can be interpreted as a pointer to the corresponding additional information in the lists. The letters E, A, C of the list numbers stand for Event, Action, Condition.

The following abbreviations are used:

EM End Mark

LI Length Indicator of the transport block (octet 1)

loc. local

NC Network Connection

NS Network Service

NSDU Network Service Data Unit

PLI Parameter Length Indicator

TC Transport Connection

TP Transport Protocol

TPDU Transport Protocol Data Unit

TS Transport Service

TSDU Transport Service Data Unit

AND, OR and NOT (used mainly in E 5) shall be considered as the known Boolean operators.

TABLE B—1/T.70 = 25 cm

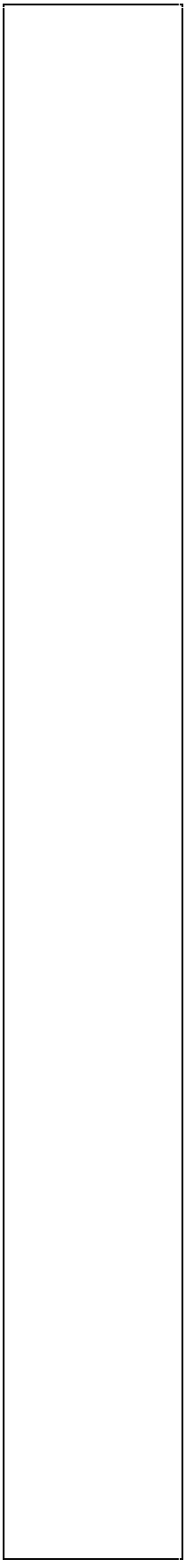


TABLE B—2/T.70 = 25 cm

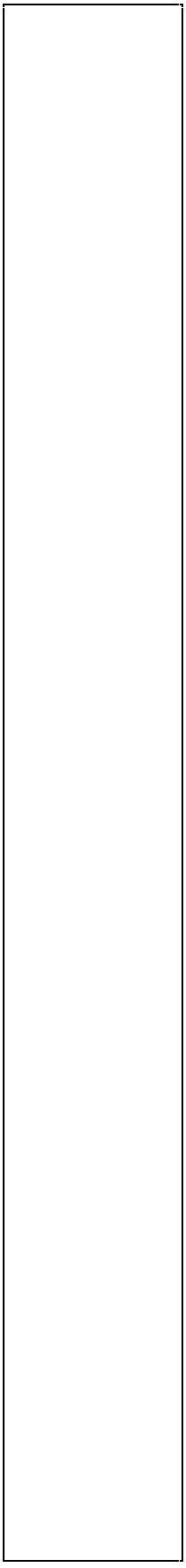


TABLE B—3/T.70

Data phase (symmetrical protocol)

	State			Data phase			
	Event			2.1			
	Local	Protocol event	Service primitive	Local	Protocol action	Service primitive	Final state
3.1		**Mont.**					2.1
3.2		**Mont.**				T—DATA ind. (A 18)	2.1
3.3		**Mont.**				T—EXCEPT. ind. (A 19)	2.1
3.4		**Mont.**				T—DISC. ind. (A 5) N—DISC. req. (A 4)	0.1
3.5		**Mont.**			S—TBR (A 3)	T—EXCEPT. ind. (A 19)	2.1
3.6		**Mont.**		START T0.3 (A 2)	S—TBR (A 3)		0.3
3.7			**Mont.**		S—TDT (EM = 0) (A 20)		2.1
3.8			**Mont.**		S—TDT (EM = 1) (A 21)		2.1
3.9	TSDU part(s)	**Mont.**			S—TDT (EM = 0) (A 20)		2.1
3.10	outsand (E 16)	**Mont.**			S—TDT (EM = 1) (A 21)		2.1
3.11			**Mont.**			T—EXCEPT. ind. (A 19)	2.1
3.12			**Mont.**			T—DISC. ind. (A 5) N—DISC. req. (A 4)	0.1
3.13			N—DISC. ind. (E 8)			T—DISC. ind. (A 5)	0.1
3.14			T—DISC. ind. (E 10)			N—DISC. ind. (A 4)	0.1

Ind. Indication

DISCO. DISCONNECTION

EXCEP. EXCEPTION

TABLE B—4/T.70

List of events

No.	Name	Type	Description
E 1	R—TCR	TP	Layer 4 receives via the NS N—DATA indication a TPDU including the transport block TCR.
E 2	R—TCC	TP	Layer 4 receives via the NS N—DATA indication a TPDU including the transport block TCC.
E 3	R—TCA	TP	Layer 4 receives via the NS N—DATA indication a TPDU including the transport block TCA.
E 4	R—TBR	TP	Layer 4 receives via the NS N—DATA indication a TPDU including the transport block TBR.
E 5	R—invalid TPDU	TP	Layer 4 receives via the NS N—DATA indication a TPDU whose validity check fails due to following reasons: — syntactical errors — procedure errors
			1. *Invalid TPDUs due to syntactical errors*
			1.1 TCR:
			1.1.1 The value of octet 1 (LI):
			1.1.1.1 the number of the TCR block octets minus 1 OR
			1.1.1.2 is greater than 127 OR
			1.1.1.3 is smaller than 6 OR
			1.1.2 see 1.6
			1.2 TCA:
			1.2.1 The value of octet 1 (LI):
			1.2.1.1 the number of the TCA block octets minus 1 OR
			1.2.1.2 is greater than 127 OR
			1.2.1.3 is smaller than 6 OR
			1.2.2 see 1.6 OR
			1.2.3 The value of octet 3 (4 resp.) octet 5 (6 resp.) of the appropriate TCR block OR
			1.2.4 The value of octet 7 0 OR
			1.2.5 The parameter “Transport Data Block Size” is present:
			1.2.5.1 AND its value 07 (hexadecimal), in response to a TCR block without the transport data block size parameter OR
			1.2.5.2 AND its value does not respond to the rules according to § 5.2.3.2 of Recommendation T.70 OR
			1.2.5.3 AND its value is different from the values (hexadecimal): 07, 08, 09, 0A, 0B OR
			1.2.5.4 AND the PLI > 1 OR
			1.2.6 LI 6 + 2N + *Ni*=1 PLI where N is the number of parameters
			1.3 TCC:
			1.3.1 The value of the LI (octet 1):
			1.3.1.1 the number of the TCC block octets minus 1 OR
			1.3.1.2 is greater than 127 OR
			1.3.1.3 is smaller than 6 OR
			1.3.2 see 1.6 OR
			1.3.3 The value of octet 3 (4 resp.) octet 5 (6 resp.) of the appropriate TCR block OR
			1.3.4 LI 6 + 2N + *Ni*=1 PLI where N is the number of parameters
			1.4 TBR: (also see § 5.4.1, Note 1)
			1.4.1 The value of the LI:
			1.4.1.1 the number of the TBR block octets minus 1 OR
			1.4.1.2 is greater than 127 OR
			1.4.1.3 is smaller than 7 OR
			1.4.2 see 1.6 OR
	(continued)		

TABLE B—4/T.70 *(cont.)*

<table>
<tr><th>No.</th><th>Name</th><th>Type</th><th>Description</th></tr>
<tr><td>E 5</td><td>R—invalid TPDU (cont.)</td><td>TP</td><td>1.4.3 The value of octet 3 (4 resp.) octet 5 (6 resp.) of the appropriate TC establishment block (TCR resp. TCA) received from the peer entityOR
1.4.4 The value of LI minus 6 value of the PLIOR
1.4.5 The Rejected block parameter is not present
1.5 TDT:
1.5.1 The value of the LI 2OR
1.5.2 The TSDU end mark is 0 AND the information field is emptyOR
1.5.3 The TDT block size is larger than negotiated in the establishment phase
1.6 No identified block:
The value of the TPDU octet 2 is not equal to one of the following values (hexadecimal): EX, DO, 80, 70, FO.
2. Invalid TPDUs due to procedure errors
ailure cases:
2.1 After S—TCR:
2.1.1 NOT R—TCAOR
2.1.2 NOT R—TCCOR
2.1.3 NOT R—TBROR
2.2 After S—TCA:
2.2.1 NOT R—TDTOR
2.2.2 NOT R—TBROR
2.3 After S—TDT:
2.3.1 Not R—TDTOR
2.3.2 Not R—TBROR
2.4 After S—TCC: NOT R—TCROR
2.5 After S—TBR: NOT R—TDT (in state 2.1)OR
2.6 After R—TDT (EM = 1): R—empty TDT (EM = 1)OR
2.7 After R—empty (EM = 1): R—empty TDT (EM = 1)OR
2.8 After N—CONNECT response: NOT R—TCR</td></tr>
<tr><td>E 6</td><td>T—CONNECT request</td><td>TS</td><td>Layer 5 requests a TC from layer 4.</td></tr>
<tr><td>E 7</td><td>N—CONNECT confirm</td><td>NS</td><td>Affirmative answer to N—CONNECT request (A 10); a NC is existing now.</td></tr>
<tr><td>E 8</td><td>N—DISCONNECT indication</td><td>NS</td><td>Report from layer 3 to layer 4 that the NC is not existing (any more).</td></tr>
<tr><td>E 9</td><td>N—RESET indication</td><td>NS</td><td>Indication to layer 4 that an error has occurred in layer 1, 2 or 3, possibly with data loss. The NC is kept existing.</td></tr>
<tr><td>E 10</td><td>T—DISCONNECT request</td><td>TS</td><td>Layer 5 requests a TC clearing from layer 4.</td></tr>
<tr><td>E 11</td><td>TIMEOUT</td><td>loc.</td><td>The timer presently surveying a state reached its limit. Following value ranges are defined:
<table>
<tr><td></td><td>Values</td><td></td></tr>
<tr><td>States</td><td>Calling side</td><td>Called side</td></tr>
<tr><td>0.2</td><td>not applicable</td><td>45 s ± 30 s</td></tr>
<tr><td>0.3</td><td>6 s ± 4 s</td><td>6 s ± 4 s</td></tr>
<tr><td>1.1</td><td>45 s ± 30 s</td><td>not applicable</td></tr>
</table></td></tr>
</table>

TABLE B—4/T.70 *(end)*

No.	Name	Type	Description
E 12	N—CONNECT indication	NS	Indication to layer 4 by the layer 3 that an NC is being established; the answer to this is N—CONNECT response (A 22) or N—DISCONNECT request (A 4).
E 13	T—CONNECT response	TS	Affirmative answer by the layer 5 to T—CONNECT indication (A 15).
E 14	R—TDT	TP	Layer 4 receives via the NS N—DATA indication, an NSDU including the transport block TDT.
E 15	T—DATA request	TS	Layer 5 requests the transmission of data. Whether this is a complete TSDU or not, is a local matter, and not subject of this definition.
E 16	TSDU part(s) outstanding	loc.	Layer 4 is ready to send the next TDT block.

TABLE B—5/T.70

List of actions

No.	Name	Type	Description
A 1	STOP Timer T1.1	loc.	Timer T1.1 surveying the state 1.1 is stopped.
A 2	START Timer T0.3	loc.	Timer T0.3 surveying the state 0.3 is started after having been reset.
A 3	S—TBR	TP	Via the NS N—DATA request a NSDU including the transport block TBR is sent to the peer entity.
A 4	N—DISCONNECT request	NS	Layer 4 requests the layer 3 to release the offered or existing NC.
A 5	T—DISCONNECT indication	TS	Layer 5 is informed by the layer 4 that the TC being established or existing is cleared.
A 6	RESTART T1.1	loc.	Timer T1.1 surveying the state 1.1 is reset and started again.
			Moreover, it is necessary either to limit the number of T1.1—restarts or to limit the sum of all the times of T1.1; otherwise, an infinite loop S—TCR — R—TCC — S—TCR — etc., would be allowed.
A 7	S—TCR	TP	Via the NS N—DATA request a NSDU including the transport block TCR is sent to the peer entity.
A 8	T—CONNECT confirm	TS	Affirmative answer to the event T—CONNECT request (E 6) indicating that the data phase of the TC has been entered.
A 9	START T0.2	loc.	Timer T0.2 surveying the state 0.2 is started after having been reset.
A 10	N—CONNECT request	NS	Layer 4 requests the layer 3 for an NC to be established.
A 11	STOP T0.2	loc.	Timer T0.2 surveying the state 0.2 is stopped.
A 12	START T1.1	loc.	Timer T1.1 surveying the state 1.1 is started after having been reset.
A 13	STOP T0.3	loc.	Timer T0.3 surveying the state 0.3 is stopped.
A 14	DISCARD any R—TPDU	TS	Any data received by N—DATA indication are discared. The transmission of further data is stopped.
A 15	T—CONNECT indication	TS	Layer 4 indicates a request for a TC—establishment to the layer 5.
A 16	RESTART T0.2	loc.	Timer T0.2 surveying the state 0.2 is reset and started again.
A 17	S—TCC	TP	Via the NS N—DATA request, an NSDU including the transport block TCC is sent to the peer entity.
A 18	T—DATA indication	TS	Layer 4 indicates the receipt of a complete TSDU to the layer 5. How and when the contents are transferred is a local matter, and therefore, not shown here.
A 19	T—EXCEPTION indication	TS	Layer 5 is informed of an error which occurred between the layer 1 and layer 4, possibly with data loss; the TC is kept existing. Due to this error it is possible that the following TSDU transferred to the layer 5 contains errors or deficiencies.
A 20	S—TDT (EM=0)	TP	A TPDU with TSDU end mark set to 0 is sent to the peer entity and further parts of the TSDU will follow (i.e., segmenting occurs).
A 21	S—TDT (EM=1)	TP	See A 20, but the TSDU end mark is set to 1 (i.e., this TPDU contains a complete TSDU or the last part of a TSDU).
A 22	N—CONNECT response	NS	Affirmative answer to N—CONNECT indication (E 12).
A 23	S—TBR	TP	The called side sends a TBR block to the calling side in order to point to a received failured TPDU. In this case the destination reference can be set to 0.
A 24	S—TCA	TP	Via the NS N—DATA request an NSDU including the transport block TCA is sent to the peer entity.

TABLE B—6/T.70

List of conditions

No.	Name	Description
C 1	Retry	The TC establishment is tried once more.
C 2	No retry	NOT C 1
C 3	TC acceptable	The TC offered by the peer entity is accepted by the layer 4 due to local circumstances.
C 4	TC not acceptable	NOT C 3
C 5	NC acceptable	The NC offered by the layer 3 is accepted by the layer 4 due to local circumstances.
C 6	NC not acceptable	NOT C 5
C 7	EM = 0	TSDU end mark of the TDT block is 0
C 8	EM = 1	TSDU end mark of the TDT block is 1
C 9	Recovery	The terminal provides the TS T—EXCEPTION indication
C 10	No recovery	NOT C 9
C 11	Segmentation	The TSDU received from layer 5 is longer than the negotiated TDT block size and has, therefore, to be segmented and consequently, to be reassembled on the receiver side.
C 12	No segmentation	NOT C 11

ANNEX C

(to Recommendation T.70)

Recommendations for implementation of Recommendation X.21

C.1 General

This Annex deals with recommended actions to be taken by a telematic DTE in relation to the receipt of call progress (CP) signals from the network and in relation to the handling of optional user facilities. The adherence to these recommendations is not mandatory in order to conform to Recommendation T.70 but may be of importance for the performance of the DTE.

Telematic terminals are in general assumed to make automatic repeated call attempts and sequential automatic calls to a number of addresses for which the following actions apply.

C.2 Receipt of call progress signals 01 or 04

When one of the CPS 01 or 04 is received the DTE should use the timer T3B and wait up to 60s for the completion of the call.

C.3 Receipt of call progress signal 03

The DTE should use either timer T3A or T3B in this case, depending on the time the DTE is prepared to wait for the completion of the call. Observe that the queuing time is charged as communication time in some networks.

C.4 Receipt of call progress signals of the group 2 to 8

See Table C—1/T.70.

TABLE C—1/T.70

Code group/Code	Delay for reattempts (s)	Number of reattempts	Delay between series of reattempts (s)
2, 6	≥ 5	≤ 7	≥ 60
41, 42, 43, 48 5, 8	≥ 5	≤ 1	Reattempts are not recommended
44, 45, 46, 47, 49 7	≥ 5	≤ 1	≥ 600

Note — Some networks charge for call attempts, when the call is unsuccessful due to the condition of the called DTE. Examples of such situations are the receipt of the call progress signals 21 (busy) and 45 (controlled not ready).

ANNEX D

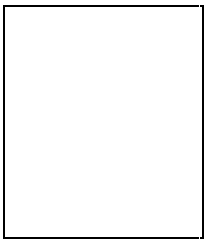
(to Recommendation T.70)

Service definitions and state transition diagrams for the HDLC procedure and the network layer defined for CSPDN

D.1 *Service definitions*

D.1.1 *Physical service used by HDLC*

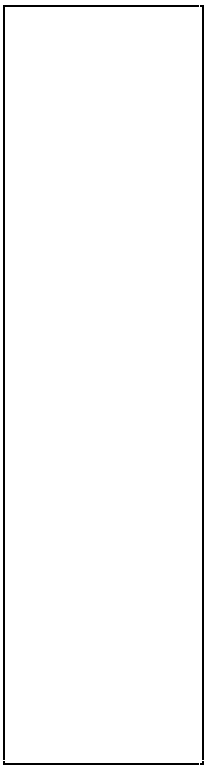
Fig. D—1/T.70 /T0801310-87 = 5 cm



D.1.2 *Data link service (HDLC)*

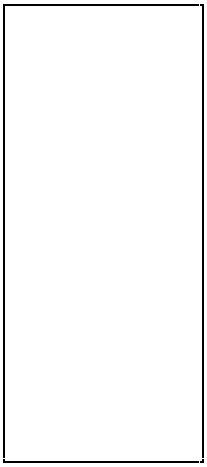
D.1.2.1 *Data link connection establishment*

Figs. D—2/T.70 and D—3 /T0801320-87 and T0801330-87



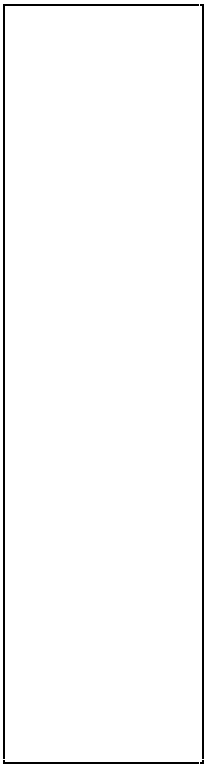
D.1.2.2 *Data link transfer phase*

Fig. D—4/T.70 /T0801340-87 = 5 cm



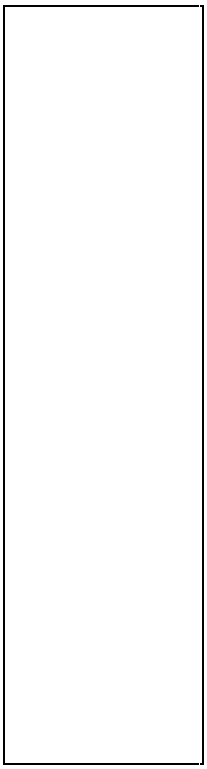
D.1.2.3 *Data link release*

Figs. D—5/T.70 and D—36 /T0801350-87 and T0801360-87

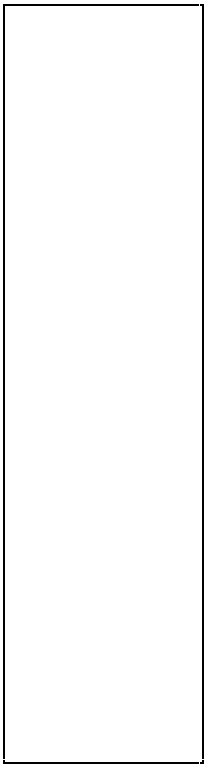


D.1.2.4 *Data link resetting*

Figs. D—7/T.70 and D—8 /T0801370-87 and T0801380-87



Figs. D—9/T.70 and D—10 /T0801390-87 and T0801400-87



D.2 *State transition diagrams HDLC*

D.2.1 *The relation between the diagrams*

The following diagrams describe the HDLC procedure as one functional unit. The first page comprises the whole protocol and the following page gives the details to specific states.

D.2.2 *Abbreviations*

ABM Asynchronous balanced mode

ADM Asynchronous disconnected mode

R:xxx Receive xxx (command or response)

R:Cxxx Receive a command

R:Rxxx Receive a response

S:xxx Send xxx

F Final bit

P Poll bit

XXX Not this condition

RC Redrive counter

RCB Redrive counter busy

IC I—Frame counter

V_{uu} Variable for sequence updating

Fig. D—11/T.70 /T0801410-87 = 25 cm

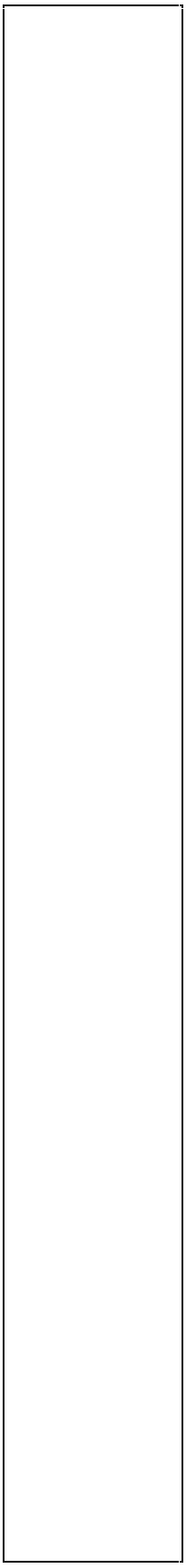


Fig. D—12/T.70 /T0801430-87 = 25 cm

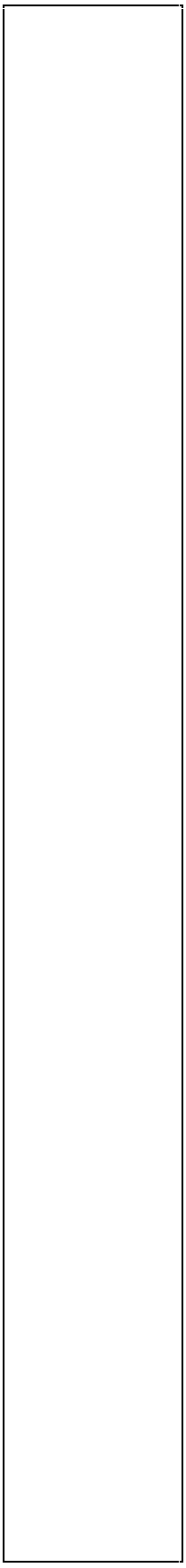


Fig. D—13/T.70 /T0801420-87 = 25 cm

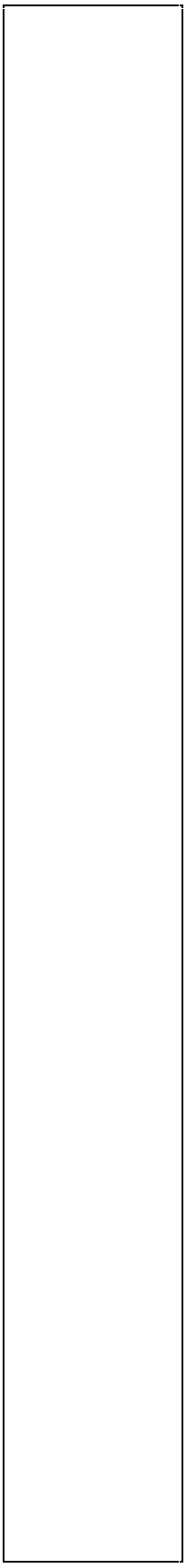


Fig. D—14/T.70 /T0801440-87 = 25 cm

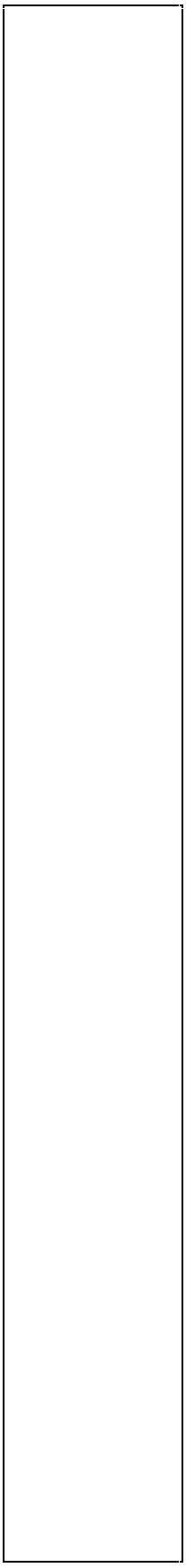


Fig. D—15/T.70 /T0801450-87 = 25 cm

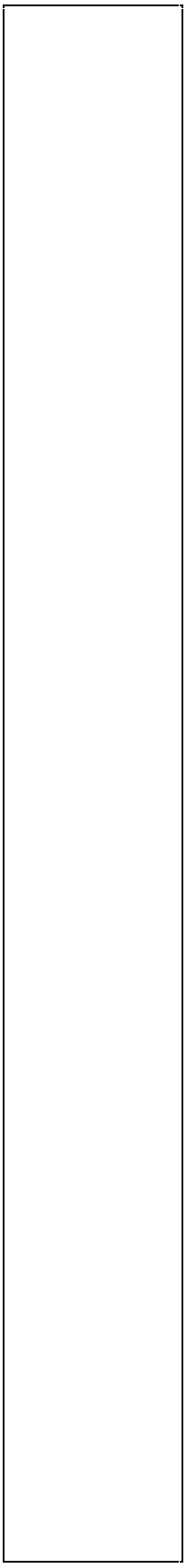
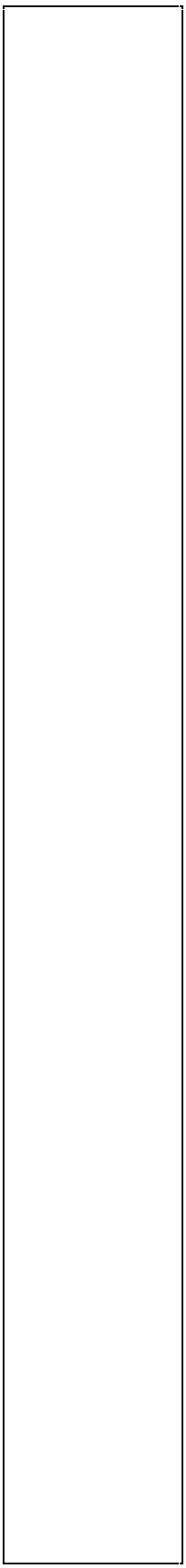


Fig. D—16/T.70 /T0801460-87 = 25 cm



D.3 *Summary of frame definitions*

D.3.1 *Invalid frame*

— frames not properly bounded by flags;

— frames containing addresses other than A or B;

— frames with frame check sequence (FCS) error;

— frames containing less than 32 bits between blags.

D.3.2 *Valid frames*

D.3.2.1 *Not expected frames*

NEF, not expected frames (for the receiver) which lead to a frame reject condition (excluding frames with a FRMR control field):

— a command or response control field that is undefined or not implemented;	Type W
— a frame with an information field which is not permitted or supervisory or unnumbered frame with incorrect length;	Type X
— an I—frame with an information field which exceeds the maximum established length;	Type Y
— a frame with an invalid N (R).	Type Z

D.3.2.2 *Expected frames*

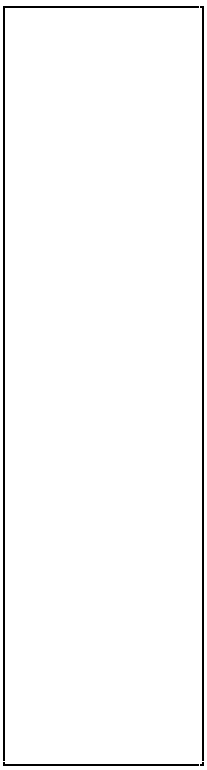
— frames which must lead to a reaction (in accordance to the Recommendation) by the receiving station;

— frames which must be ignored only in determined states by the receiving station.

D.4 *X.21 service, controlled by the network layer*

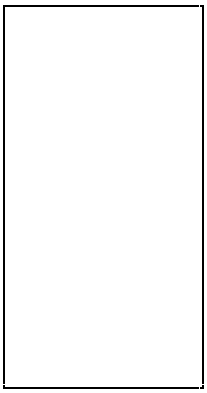
D.4.1 *X.21 connection establishment*

Figs. D—17/T.70 /T0801470-87 and D—18/T.70 /T0801480-87 = 11 cm

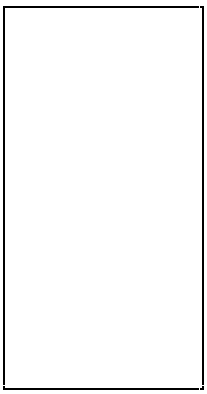


D.4.2 *X.21 connection release*

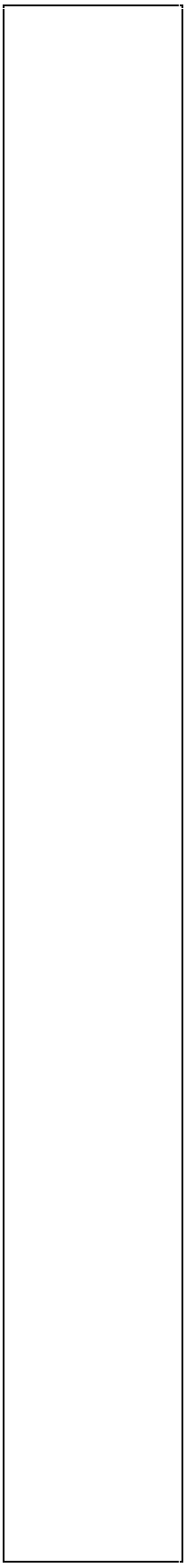
Figs. D—19/T.70 /T0801490-87 = 5 cm



D—20/T.70 /T0801500-87 = 5 cm



Figs. D—21/T.70 /T0801510-87 = 25 cm



D—22/T.70 /T0801520-87 = 25 cm

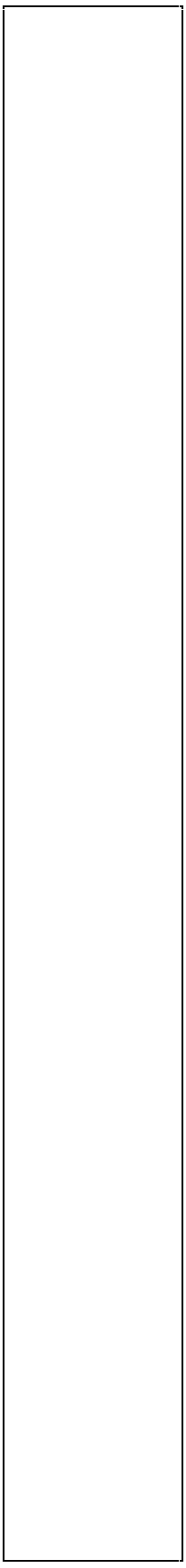


TABLE D—1/T.70

Application rules regarding the network protocol data unit (NPDU)

Conditions ↓		Combination of conditions								
		a	b	c	d	e	f	g	h	i
C1	Transmit/receive	T	T	T	T	T	R	R	R	R
C2	NPDU length (octet)	> 2	> 2	> 2	> 2	< 3	> 2	> 2	> 2	< 3
C3	1st octet 01/<>	01	01	01	<>	*	01	01	<>	*
C4	2nd octet bits 1 to 7	0	0	<>	*	*	*	*	*	*
C5	2nd octet bit 8 (M—bit)	0	1	*	*	*	0	1	*	*
Actions/applications rules										
A1	Correct/acceptable	X				X (Note)				
A2	N—DISC ind., DL—DISC req.								X	X
A3	Not allowed		X	X	X	X				
A4	Error case								X	X

Note — The Teletex system has to accept as many NPDUs, that at least, the same number of octets can be received as contained in the maximum negotiable transport block size.

C Condition

A Action/application rule

T Transmit

R Receive

<> Not equal

* Not relevant

X Valid/applicable