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INTERNATIONAL TELECOMMUNICATION UNION

CCITT **T.563**
THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

TERMINAL EQUIPMENT AND PROTOCOLS FOR TELEMATIC SERVICES

TERMINAL CHARACTERISTICS FOR GROUP 4 FACSIMILE APPARATUS

Recommendation T.563

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Geneva, 1991

Printed in Switzerland

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is the permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in Resolution No. 2 (Melbourne, 1988).

Recommendation T.563 was prepared by Study Group VIII and was approved under the Resolution

No. 2 procedure on the 18th of January 1991.

CCITT NOTE

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

Recommendation T.563
Recommendation T.563

TERMINAL CHARACTERISTICS FOR GROUP 4 FACSIMILE APPARATUS

(Revised 1990)

CONTENTS

The CCITT,

considering

(a) that Recommendation T.2 refers to Group 1 type apparatus for ISO A4 document transmission over a telephone-type circuit in approximately six minutes;

(b) that Recommendation T.3 refers to Group 2 type apparatus for ISO A4 document transmission over a telephone-type circuit in approximately three minutes;

(c) that Recommendation T.4 refers to Group 3 type apparatus for ISO A4 document transmission over a telephone-type circuit in approximately one minute;

(d) that there is a demand for Group 4 apparatus which incorporates means for reducing the transmission time and assures essentially error-free reception of the documents;

(e) that telematic terminals including Group 4 facsimile apparatus are to be standardized, taking into account the commonality among these terminals;

(f) that there is a demand for mixed mode of operation where both facsimile coded information and character coded information can be treated within a page by the same apparatus;

unanimously declares

that Group 4 facsimile apparatus as defined in Recommendation T.0 should be designed and operated according to the following standard.

1 General

1.1 Group 4 facsimile apparatus is used mainly on public data networks (PDN) including circuit-switched, packet-switched, and the integrated services digital network (ISDN). The apparatus may be also used on the public switched telephone network (PSTN) where an appropriate modulation process will be utilized.

1.2 The procedures used with Group 4 facsimile apparatus enable it to transmit and reproduce image coded information essentially without transmission errors.

1.3 Group 4 facsimile apparatus has the means for reducing the redundant information in facsimile signals prior to transmission.

1.4 The basic image type of the Group 4 facsimile apparatus is black and white.

Other image types, e.g. grey scale image or colour image are for further study.

1.5 There are three classes of Group 4 facsimile terminals:

ù *Class I* ù Minimum requirement is a terminal able to send and receive documents containing facsimile encoded information (in accordance with Recommendation T.6, T.503 and T.521).

ù *Class II* ù Minimum requirement is a terminal able to transmit documents which are facsimile encoded (in accordance with Recommendations T.6, T.503 and T.521). In addition, the terminal must be capable of receiving documents which are facsimile coded (in accordance with Recommendations T.6, T.503 and T.521). Teletex coded (in accordance with the basic coded character repertoire as defined in Recommendations T.60 and T.61), and also mixed-mode documents (in accordance with Recommendation T.561).

ù *Class III* ù Minimum requirement is a terminal which is capable of generating, transmitting and receiving facsimile coded documents (in accordance with the Recommendations T.6, T.503 and T.521), Teletex coded documents (in accordance with the basic coded character repertoire as defined in Recommendations T.60 and T.61), and mixed-mode documents (in accordance with Recommendation T.561). See Note.

Note ù The above definitions are extracted from Study Group I where "terminal" is used instead of "apparatus".

2 Scope of Recommendations concerning Group 4 facsimile apparatus

2.1 This Recommendation defines the general aspects of Group 4 facsimile apparatus.

2.2 The rules to be followed in the Group 4 facsimile services are defined in Recommendation F.184.

2.3 The Group 4 facsimile coding scheme and facsimile control functions are defined in Recommendation T.6.

2.4 Terminal supporting Group 4 facsimile mode of operation communicates with unique procedures that are described as follows:

a) the interface to the physical network is defined in this Recommendation. See Note;
b) the transport end-to-end control procedure is defined in Recommendation T.70;
c) Group 4 facsimile control procedures are defined in Recommendation T.62;

d) Group 4 facsimile communication application profile is defined in Recommendation T.521;
e) Group 4 facsimile document application profile is defined in Recommendation T.503.

Note ù Recommendation T.71 may be applicable for PSTN operation.

2.5 When operating as mixed-mode terminals, Recommendation T.561 applies.

2.6 When operating as basic Teletex terminals, Recommendations T.60 and T.61 apply.

3 General characteristics of the apparatus

3.1 *Basic characteristics*

3.1.1 The Group 4 facsimile apparatus provides the means for direct document transmission from any subscriber to any other subscriber.

3.1.2 All apparatus participating in the international Group 4 facsimile service has to be compatible with each other at the basic level defined in this Recommendation. Additional operational functions may be invoked.

3.1.3 The range of data rates is described in S 6. Detailed arrangements on a national level are left to the Administrations concerned, as it is recognized that national implementation of the Group 4 facsimile service on various types of network may involve national operation at different data throughput rates.

3.1.4 The page is the basis for facsimile message formatting and transmission. Both A4 and North American paper formats are taken into account.

3.1.5 Facsimile coding schemes are applied in order to reduce the redundant information in facsimile signals prior to transmission.

3.1.6 The apparatus must have the ability to reproduce facsimile messages. The content, layer and format of facsimile messages must be identical at the transmitting and receiving apparatus.

3.1.7 The reproducible area is defined within which facsimile messages are assured to be reproduced. (See S 3.2.6.)

3.1.8 The Group 4 facsimile apparatus should provide means for automatic reception. In addition, Class II/III apparatus should provide means for automatic reception of Teletex and mixed mode documents.

3.1.9 All classes of Group 4 facsimile apparatus shall incorporate the functions defined as basic for the Group 4 facsimile service in S 3.2 below. In addition, optional functions can be incorporated. In this Recommendation, the optional functions are divided into CCITT standardized options and nationally and/or privately specified options.

3.2 *Basic functions*

3.2.1 Group 4 facsimile mode of operation shall be capable of handling:

a) communication application profile as defined in Recommendation T.521;
b) document application profile as defined in Recommendation T.503;
c) the basic facsimile coding scheme as defined in Recommendation T.6;
d) the control function associated with the basic facsimile coding scheme as defined in Recommendation T.6.

3.2.2 All classes of Group 4 apparatus shall have the following provisions for facsimile messages:

a) provision for scanning the documents to be transmitted (see S 3.2.5);

b) provision for receiving and presenting hard or soft copies of the documents.

3.2.2.1 In addition, Group 4 Class II apparatus shall have provision for receiving and displaying basic Teletex and mixed mode documents.

3.2.2.2 In addition to the requirements for Group 4 Class II apparatus, Class III apparatus shall have provisions for generating and transmitting basic Teletex and mixed mode documents.

3.2.3 *Basic page formatting functions are as follows*

a) vertical page orientation;

b) paper size of ISO A4;

c) reproducible area/printable area is defined, taking into account ISO A4 and North American paper formats and ISO standard 3535.

3.2.4 *Terminal identification*

Each Group 4 facsimile apparatus should be equipped with a unique identification. Details of the identification are given in Recommendation F.184.

3.2.5 *Scanning*

The message area should be scanned in the same direction in the transmitter and receiver. Viewing the message area in a vertical plane, the picture elements shall be processed as if the scanning direction were from left to right with subsequent scans adjacent to and below the previous scan.

3.2.6 *Page size and reproducible area*

3.2.6.1 Sometimes paper length may not be specified, because the paper end is detected by paper scanning.

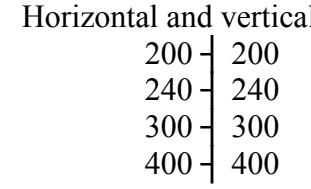
3.2.6.2 The size of the guaranteed reproducible area for ISO A4 paper size is shown in Annex A to this Recommendation.

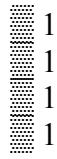
3.2.7 *Group 4 facsimile transmission pel density (resolution) requirements*

The Group 4 facsimile resolution requirements and their tolerances are given in Table 1/T.563.

include 563-t01eTABLE 1/T.563

Resolution (pels/25.4 mm)


Horizontal and vertical tolerance (%)
200
240
300
400
200
240
300
400



Centre line referencing will be used for paper positioning. Each page will be positioned on the scanner so that the centre line is in registration with the value: (number of pels/line)/2. (For further study.)

Specific values for the number of pels per line, scan line length and nominal number of scan lines per page are given in Tables 2a/T.563 and 2b/T.563 for all the Group 4 resolutions for ISO A4, North American Letter, ISO B4, ISO A3, Japanese Legal, Japanese Letter, North American Legal and North American Ledger paper.

Tableau 563-T02E à l'italienne

Tableau 563-T03E à l'italienne

Table 3/T.563 specifies the blanking procedure for all of the Group 4 paper sizes. An equal number of pels on the left and right side of the page are set to white to fit the paper format. Figure 1/T.563 illustrates the blanking procedure for ISO A4 and North American Letter paper. The same procedure is used for the other paper formats.

include 563-t04eTABLE 3/T.563

Blanking and address reference point for different paper sizes

Paper size

Resolution
(pels/25.4 mm)

Pels per
line

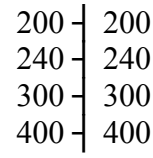
Pels per each paper size line

Blanki
ng margin (pels)

Referen
ce point

Total line length (mm)

ISO A4


200
240
300
400
200
240
300
400

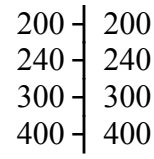
1728
2074
2592
3456

1654
1984
2480
3308

(B)
333333
7
333334
5
333335
6
333337
4

(38.1)
(46.1
)
(57.1
)
(75.1
)

219.46
219.46
219.46
219.46
North
American
Letter


200
240
300
400
200
240
300
400

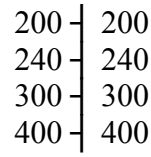
1728
2074
2592
3456

1700
2040
2550
3400

(A)
333331
4
333311
7
333332
1
333332
8

(15.1)
(18.1
)
(22.1
)
(29.1
)

219.46
219.46
219.46
219.46
ISO B4


200
240
300
400
200
240
300
400

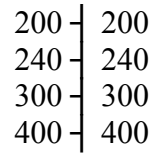
2048
2458
3072
4096

1968
2362
2952
3936

333334
0
333334
8
333336
0
333338
0

(41.1)
(49.1
)
(61.1
)
(81.1
)

260.10
260.10
260.10
260.10
ISO A3


200
240
300
400
200
240
300
400

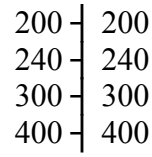
2432
2918
3648
4864

2338
2806
3508
4676

333334
7
333315
6
333337
0
333339
4

(48.1)
(57.1
)
(71.1
)
(95.1
)

308.86
308.86
308.86
308.86
Japanese
Legal


200
240
300
400
200
240
300
400

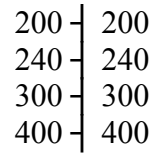
2048
2458
3072
4096

2024
2428
3036
4048

333331
2
333311
5
333331
8
333332
4

(13.1)
(16.1
)
(19.1
)
(25.1
)

260.10
260.10
260.10
260.10
Japanese
Letter


200
240
300
400
200
240
300
400

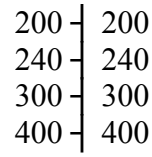
1728
2074
2592
3456

1434
1720
2150
2868

3333147
3333177
3333221
3333294

(148. 1)
(178. 1)
(222. 1)
(295. 1)

	219.46
	219.46
	219.46
	219.46
North American Legal	


200
240
300
400
200
240
300
400

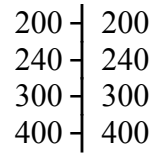
1728
2074
2592
3456

1700
2040
2550
3400

333331
4
333311
7
333332
1
333332
8

(15.1)
(18.1
)
(22.1
)
(29.1
)

219.46
219.46
219.46
219.46
North
American
Ledger


200
240
300
400
200
240
300
400

2432
2918
3648
4864

2200
2640
3300
4400

333311
6
333313
9
333317
4
333323
2

(117. 1)
(140. 1)
(175. 1)
(233. 1)

308.86
308.86
308.86
308.86

Note ù The pels as defined in the blanking margin section (blanking margin A and B are shown in Fig.1/T.563) are equivalent to the discarded pels defined in Recommendation T.503.

The raster point in the upper left corner of an ISO page is used as a reference for portrait mode character printing. This raster point, termed the (1.1) raster reference point, is used as a starting point for determining character margins and positions. This is also illustrated in Figure 1/T.563.

FIGURE 1/T.563 = 23.5 cm

3.2.8 *Group 4 facsimile class structure*

Table 4/T.563 shows the class structure of Group 4 facsimile apparatus.

include 563-t05eTABLE 4/T.563

Class structure

Class

I
(See Note 1)

II
(See Note 1)

III (See Note 1)	Standard pel transmission density (pels/25.4 mm)

200 and 300
(See Note 2)

	200 and 300 (See Note 2) Optional pel transmission density (pels/25.4 mm)

240 and/or 300
and/or 400

240 and/or 400
(See Note 3)

240 and/or 400
(See Note 3)
Pel conversion
capability in standard

Not required

Yes

Yes

Teletex

Not required

Reception only

Yes
Mixed mode

Not required

Reception only

Yes
Page memory

Not required

Yes

Yes
Use of document
application profile

See Table 5/T.563
Use of communication application profile

See Table 5/T.563

Note 1 ù Administrations may determine which class, with options, to be used for their national service. Standardization work has to continue with the goal of achieving a uniform standard.

Note 2 ù When operating as a mixed mode terminal per Recommendation T.561, the pel receiving density of 240 pels per 25.4 mm is required.

Note 3 ù To achieve a high service quality, the pel density of the scanner and printer should be greater than or equal to the transmission pel density. This requirement is waived for a terminal which has a scanner or printer with a pel density of 240 ┤ 240 pels per 25.4 mm and can communicate at 300 pels per 25.4 mm. In this case, the 240 ┤ 240 pels per 25.4 mm terminal will exceptionally meet the standard Class II/III requirement.

Note 4 ù When a resolution conversion is necessary, the conversion is performed by the apparatus which minimizes the transmission cost and time. An exception would be a 240 ┤ 240 pels per 25.4 mm terminal transmitting to a 300 ┤ 300 pels per 25.4 mm terminal which is operating at the standard transmission density.

Note 5 ù Pel conversion algorithms should aim at low impairment of the quality and are for further study.

3.2.9 *Facsimile coding schemes*

3.2.9.1 In order to reduce the redundant information in facsimile signals, the basic facsimile coding scheme is defined in Recommendation T.6. This coding scheme is used assuming that transmission errors are corrected by control procedures in lower levels.

3.2.9.2 On an optional basis, an apparatus can use other CCITT standardized coding schemes defined in Recommendation T.6.

3.2.9.3 When the encoded bit string based on T.6 is arranged in the octet string of ASN.1, the first bit of encoded image should be placed in LSB of octet. The successive bits are placed in the direction of LSB to MSB of octet.

3.3 *CCITT-standardized optional functions of Group 4 facsimile mode of operation*

3.3.1 The possibility of using optional functions can be negotiated during a handshaking procedure in the communication application profile (see Recommendation T.521).

3.3.2 The optional functions are invoked by the communication application profile (see Recommendation T.521).

3.3.3 As the service develops, additions and changes to the CCITT-standardized optional function listed below may be needed.

a) optional coding schemes defined in Recommendation T.6;
b) control functions associated with optional coding schemes;
c) grey scale images;
d) colour images;
e) resolution conversion algorithms.

3.3.4 Optional page formatting functions are as follows:

a) page sizes of ISO B4, ISO A3, Japanese legal, Japanese letter, North American legal and North American ledger;
b) other page formats are for further study.

3.4 *Optional functions of Group 4 facsimile mode of operation for national standardization or private use*

The CCITT standardization includes the necessary rules and means for indication of, or escape into, functions specified nationally or for private use (see Recommendations T.62 and T.521).

3.5 *Default conditions for Group 4 facsimile mode of operation*

In the absence of specific indications, the receiving apparatus shall assume the following conditions:

a) communication (as specified in Recommendation T.521):
   ù one way (calling apparatus transmitting the facsimile message);
   ù normal document;
b) coding scheme:
   ù basic facsimile coding scheme;
c) image type:

- ù black and white two-level image;

d) presentation:
   - ù paper size of ISO A4;
   - ù pel transmission density of 200 pels per 25.4 mm;
   - ù number of picture elements along scan line of defined values in Table 3/T.563;
   - ù blanking margin of defined values in Table 3/T.563
   - ù vertical page of orientation.

4 Mixed mode capabilities

For mixed mode of operation, requirements for Group 4 Class II and III terminals are specified in Recommendation T.561.

5 Communications

5.1 *Storage*

Receiving storage is not required for Group 4 Class I terminals. The minimum storage requirement for Group 4 Class II and III is 128 K octets. This value is based on a pel transmission density of 300 pels per 25.4 mm for an ISO A4 document. However, this does not cover the worst case situation for dense documents. Additional memory may be required and can be negotiated.

5.2 *Call identification*

The control procedures include the exchange of reference information prior to sending any document. Details of the call identification line are covered in Recommendation F.184.

Printing capability of the Call Identification Line (CIL) is mandatory. The printing of the CIL is selected by the user.

If printing is selected, the CIL is printed on a reserved area at either the top of the page or the bottom. Refer to Figure A-1/T.563. The reserved area is 4.23 mm (200 BMU) in height and 183 mm (8640 BMU) in width. The size of the basic measurement unit (BMU) is 1/1200 per 25.4 mm.

5.3 *Interworking*

There are three document types, namely "Facsimile", "Mixed Mode" and "Basic Teletex". These are shown in Table 5/T.563. A terminal can transfer one or more documents of the same type in a single association. In the case of "Facsimile" or "Mixed Mode", the document type is indicated in D-INITIATE service primitive using the parameter "document application profile". If the document type is not supported by the called terminal, this will be indicated by the "result" parameter of the D-INITIATE service confirmation.

include 563-t06eTABLE 5/T.563

Document type

Document type

Group 4 facsimile

Mixed Mode

Basic Teletex

Class of Group 4 facsimile apparatus

Class I, II & III

Class II & III

Class II & III

Document
Architecture
Class

FDA

	none (See Note 2)	
Document Application Profile		

Rec. T.503
(See Note 1)

non Profile
(See Note 2)
Communication
Application Profile

non Profile
(See Note 2)

Note 1 ù When using the Group 4 facsimile mode, Document Profile Descriptor defined in Recommendation T.503 is not transmitted using session protocol data unit (SPDU).

Note 2 ù Basic Teletex documents are transmitted outside DTAM application.

The negotiation and indication mechanisms are defined in Recommendation T.433. Appendix I illustrates some example of the session establishment phase. Table 6/T.563 specifies the interworking matrix among Group 4 facsimile apparatus based on negotiation result.

include 563-t07eTABLE 6/T.563

Interworking Matrix among Group 4 facsimile apparatus

Sender

Receiver

Class I

Class II

Class III

Class I

Group 4
facsimile

Group 4
facsimile

Group 4
facsimile
Class II

Group 4
facsimile

Group 4
facsimile

Group 4
facsimile
Mixed Mode
Basic Teletex
Class III

Group 4
facsimile

Group 4
facsimile

Group 4 facsimile
Mixed Mode
Basic Teletex

5.4 *Communication application profile for Group 4 facsimile document*

The communication application profile to be used is BT 0, specified in Recommendation T.521.

Specific parameter values to be used in the D-INITIATE and D-CAPABILITY service primitive are:

ù the parameter value to represent the document application profile for Group 4 facsimile is defined in Recommendation T.503;

ù the parameter value to represent the document architecture class is FDA, defined in Recommendation T.412.

6 Network-related requirements

6.1 *Networks*

The Group 4 facsimile transport service can be provided using a circuit-switched public data network (CSPDN), a packet-switched public data network (PSPDN), a public switched telephone network (PSTN), or an integrated services digital network (ISDN). In all types of network the Group 4 facsimile apparatus will provide automatic answering, transmission, reception and clearing.

6.2 *Circuit-switched public data network (CSPDN)*

a) Function and procedural aspect of the interface: Recommendation X.21.
b) With external data circuit terminating equipment (DCE) ù mechanical and electrical and characteristics of the interface: Recommendation X.21.
c) Bit rates: user classes of services 4 to 7 in Recommendation X.1.
d) Link procedure: LAPB/Recommendation X.75.

6.3 *Packet-switched public data network (PSPDN)*

a) Function and procedural aspects of the interface: Recommendation X.25, levels 1, 2, 3.
b) Duplex transmission.
c) Bit rates: user classes of services 8 to 11 in Recommendation X.1.
d) Number of logical channels at a time: one or more.

6.4 *Public switched telephone network (PSTN)*

a) Modulation/demodulation schemes are for further study.
b) Function and procedural aspects of the interface: for further study.
c) Link procedure: Recommendation T.71 may be applicable.
d) Bit rate: for further study.
e) Automatic answering: Recommendation V.25.

6.5 *Integrated services digital network (ISDN)*

The operations and rules of Group 4 facsimile apparatus on the ISDN are defined in Recommendation T.90.

7 Indicators

7.1 Indicators should inform users about situations in which negative effects on the grade of service can be expected.

7.2 The following indicators are required:

a) apparatus unable to transmit (e.g. paper jam at transmitting end);
b) apparatus unable or soon unable to receive (e.g. paper jam or receiving memory nearly full);
c) operator assistance required;
d) message received in store.

8 Access to facsimile MHS

Users of Group 4 facsimile apparatus may wish to have access to the services offered by the message handling system (MHS). This requires the ability to generate control documents (see Recommendation T.300 series). The details are left for further study.

9 Implementation of apparatus

Although paper sizes are referred to, this does not always require physical paper scanner and/or printer to be implemented. Details may be defined by Administrations.

If the message is not generated from a physical scanner or displayed on paper, then the signals appearing across the network interface shall be identical to those which would be generated if paper input and/or output has been implemented.

ANNEX A

(to Recommendation T. 563)

Guaranteed reproducible area for Group 4 apparatus conforming to Recommendation T.563

FIGURE A-1/T.563 = 11,5cm

FIGURE A-2/T.563 = 9,5 cm

include 563-t08eTABLE A-1/T.563

Horizontal losses

Printer/Scanner

a

Enlarging

b


2.1 mm
Skew

c

Positioning errors

d


1.5 mm

FIGURE A-3/T.563 = 10 cm

include 563-t09eTABLE A-2/T.563

Vertical losses

Paper insertion

f

4.0 mm

CIL printing

g

4.23 mm
Skew

h


1.8 mm
Scan line tolerance
(see Note)


2.97 mm
Gripping loss

j

2.0 mm
Note ù Scanning density tolerance will reduce to 0 mm on roll-fed machines

APPENDIX I

(to Recommendation T.563)

Communication environment establishment

I.1 Table I.1/T.563 summarizes the selection of communication application profile and initial session command exchange.

include 563-t10eTABLE I-1/T.563

Selection of communication application profile

Called

Calling

G-4 Class I

Basic teletex
G4 class I

T.521
CSS/RSSP (no SUD)
(Calling terminal:
Disconnect)
G4 class II

T.521
CSS/RSSP (no SUD)
(Calling terminal:
Disconnect)
G4 class III

T.522
CN[a)]/RSSP
T.521 selection
(fall back)

T.522
CN[a)]/RSSP
T.62 selection
Basic teletex

T.62 (no SUD)
CSS/RSSN
(Calling terminal:
Disconnect)

T.62 (no SUD)
CSS/RSSP

T.62 (no SUD)
CSS/RSSP

	T.62 (no SUD)
CSS/RSSP	[a] When interworking with T.62 based equipment, Service Identifier parameter defined in T.62 is present in the CONNECT SPDU. CN CONNECTION SPDU defined in Recommendation X.225 AC ACCEPT SPDU defined in Recommendation X.225

I.2 Some examples of the session establishment phase are as follows:

I.2.1 *In case of Group 4 Class I terminal calling* (see Figure I-1/T.563)

FIGURE I-1/T.563 = 12,5 cm

I.2.2 *In case of Group 4 Class II terminal calling* (see Figure I-2/T.563)

FIGURE I-2/T.563 = 12,5 cm

I.2.3 *In case of Group 4 Class III terminal calling* (see Figure I-3/T.563)

FIGURE I-3/T.563 (Sheet 1 of 2) = 15,5 cm

FIGURE I-3/T.563 (Sheet 2 of 2) = 16 cm

I.2.4 *In case of basic Teletex terminal calling* (see Figure I-4/T.563)

FIGURE I-4/T.563 = 7,5 cm