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SERIES T: TERMINAL EQUIPMENT AND PROTOCOLS FOR TELEMATIC SERVICES

OPEN DOCUMENT ARCHITECTURE (ODA) AND INTERCHANGE FORMAT – CHARACTER CONTENT ARCHITECTURES

Reedition of CCITT Recommendation T.416 published in the Blue Book, Fascicle VII.6 (1988)

NOTES

1 CCITT Recommendation T.416 was published in Fascicle VII.6 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

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

Recommendation T.416

OPEN DOCUMENT ARCHITECTURE (ODA) AND INTERCHANGE FORMAT - CHARACTER CONTENT ARCHITECTURES[1)]

CONTENTS

[1)] This text is aligned with the final text of the corresponding International ISO 8613-6.

1 Scope

1.1 The purpose of the T.410 Series is to facilitate the interchange of documents.

In the context of the T.410 Series, documents are considered to be items such as memoranda, letters, invoices, forms and reports, which may include pictures and tabular material. The content elements used within the documents may include graphic characters, geometric graphic elements and raster graphic elements, all potentially within one document.

Note – The T.410 Series is designed to allow for extensions, including typographical features, colour, spreadsheets and additional types of content such as sound.

1.2 The T.410 Series of Recommendations applies to the interchange of documents by means of data communications or the exchange of storage media.

The T.410 Series provides for the interchange of documents for either or both of the following purposes:

- to allow presentation as intended by the originator;
- to allow processing such as editing and reformatting.

The composition of a document in interchange can take several forms:

- formatted form, allowing presentation of the document;
- processable form, allowing processing of the document;
- formatted processable form, allowing both presentation and processing.

The T.410 Series also provides for the interchange of ODA information structures used for the processing of interchanged documents.

Furthermore, the T.410 Series allows for the interchange of documents containing one or more different types of content such as character text, images graphics and sound.

1.3 This Recommendation:

- defines character content architectures that can be used in conjunction with the document architecture defined in Recommendation T.412;
- defines the internal structure of content conforming to these character content architectures;
- defines those aspects of positioning and imaging applicable to presentation of these character content architectures in a basic layout object;
- defines the presentation attributes and control functions applicable to these character content architectures;
- describes a content layout process which, together with the document layout process described in Recommendation T.412, determines the layout of character content in basic layout objects and the dimensions of these basic layout objects.

2 References

The following Recommendations and Standards contain provisions which, through reference in this text, constitute provisions of the T.410 Series of Recommendations. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on the T.410 Series of Recommendations are encouraged to investigate the possibility of applying the most recent editions of the Recommendations and Standards listed below. Members of CCITT, ISO and IEC maintain registers of currently valid Recommendations and Standards.

- ISO 2022 (1986): Information processing – ISO 7-bit and 8-bit coded character sets – Code extension techniques.
- ISO 6429 (1983): Information processing – ISO 7-bit and 8-bit coded character sets – Additional control functions for character imaging devices.
- ISO 6937 (1983): Information processing – Coded character sets for text communication.
- Rec. T.50 (1988): International alphabet No. 5.
- Rec. X.208 (1988): Specification of abstract syntax notation one (ASN.1).
- Rec. T.61 (1988): Character repertoire and coded character sets for the international Teletex service.
- ISO 9541-5[2)]: Information processing – Font and character information interchange – Part 5: Font attributes and character model.

3 Definitions

For the purpose of this Recommendation, the definitions given in Recommendation T.411 apply.

4 General principles

4.1 *Classes*

Three classes of character content architecture are distinguished:

- a character content architecture for formatted content which allows for document content to be presented (e.g. printed or displayed) as intended by the originator. Formatted content can be used in any basic component;
- a character content architecture for processable content which allows for document content to be processed (e.g. edited or formatted). Processable content can be used in any basic logical component;
- a character content architecture for formatted processable content which allows for document content to be processed and also to be presented as intended by the originator. Formatted processable content can be used in any basic component.

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2) To be published.

4.2 *Content*

The content of a basic component that conforms to a character content architecture is a character string. This character string is formed by concatenating the character strings in the content portions of the basic component.

The content character string consists of a combination of graphic characters, control functions and space characters.

4.3 *Presentation attributes*

Presentation attributes are applicable to basic logical and layout components. They contain information that specifies the initial conditions relating to the layout, the imaging and the selection of graphic characters of the content of these basic components. Some of these conditions can be changed by control functions contained within the content.

Presentation attributes are classified as follows:

- logical presentation attributes which can be associated with processable and formatted processable character content. These attributes take effect during the content layout process but are ignored during the content imaging process;
- layout presentation attributes which can be associated with formatted and formatted processable character content. These attributes take effect during the content imaging process. They are generated either by a content layout process or by a process that creates or edits the formatted or formatted processable content;
- shared presentation attributes which can be associated with all character content architecture classes. These attributes take effect during either or both the content layout and imaging processes.

Note – Presentation attributes can be applied to the content of a basic component in one of three ways. They can be specified directly in an object or object class description or they can be specified directly by means of a presentation style associated with the object or object class description. Alternatively, they can be indirectly applied to an object or object class by means of a default value list (see Recommendation T.412).

4.4 *Control functions*

Control functions with zero or more parameters may specify information relating to the layout or imaging of subsequent graphic characters. A control function can also be used to extend or replace the set of graphic characters being used. The scope of all control functions is limited to the basic component in which they occur.

Classification of control functions is similar to that of presentation attributes:

- logical control functions which can be used in processable and formatted processable character content. These control functions take effect during the content layout process but are ignored during the content imaging process;
- layout control functions which can be used in formatted and formatted processable character content. These control functions take effect during the content imaging process. They are generated by the content layout process. Alternatively, they may be inserted by a process (not described in the T.410 Series of Recommendations) that creates of edits the formatted or formatted processable content;
- shared control functions which can be used in all character content architecture classes. These control functions take effect during either or both the content layout and imaging processes.

In addition, formatted processable content may contain control functions known as delimiters. These delimiters are used to indicate a string of one or more graphic characters and/or control functions that have been inserted as the result of a content layout process (see § 12). The delimited graphic characters and/or control functions take effect only during the content imaging process. The delimiters take effect during the content layout process by deleting them and the enclosed character sequence.

4.5 *Graphic characters*

The set of graphic characters used in the content of a basic component, and their coded representation, are specified by presentation attributes and code extension control functions (see §§ 10 and 11.1.17).

Any set or sets of graphic characters may be used in the content of basic components, subject to the restrictions associated with the particular content architecture in use and subject to proper designation and invocation in accordance with ISO 2022.

Any non-spacing characters included in a graphic character set are not to be used in isolation but only in combination with spacing characters.

4.6 *Space characters*

The character SPACE (SP) is considered both as a logical control function and as a graphic character. As a graphic character, it has a graphical representation consisting of the absence of a graphic symbol. As a control function, it indicates a potential line break point (see § 12.2.1.3.2).

Note – NBSP (No Break SPace) and any fixed-width space characters, such as "digit space", "em space" and "en space" are regarded as graphic characters i.e. are not regarded as line break points.

4.7 *Coding of content information*

The coded representation of the content information within a content portion is in accordance with the rules specified in ISO 2022.

Coded representations of control functions are defined in ISO 6429 and are summarized in Annex C.

4.8 *Internal structure*

4.8.1 *Formatted content*

Formatted content is content for which all the necessary information relating to the layout and imaging of that content has been specified. Content in this form is intended to be imaged as specified and is not intended to be revised by an editing process or to be reformatted.

The content of a basic component conforming to a formatted character content architecture consists of one or more lines of characters. Each pair of successive lines is separated by a hard line terminator. The last (or only) line may or may not be terminated by a hard line terminator; the end of the content of a basic component implicitly terminates the last line.

4.8.2 *Processable content*

Processable content is content which has not been laid out. Content in this form is suitable for revision by an editing process.

Note – The editing process is implementation dependent and is not described in the T.410 Series of Recommendations.

In order to image content in this form, it is necessary to apply a content layout process (see § 12) to the content which converts the processable content into formatted content (see § 4.8.1) or into formatted processable content (see § 4.8.3).

To assist the processing (i.e. editing or layout processes) of processable content, a number of logical presentation attributes and control functions have been defined (see § 7 and 11). In addition, the character SPACE is regarded as both a graphic character and as a control function that indicates where a line break may occur when the content is laid out.

The content of a basic component conforming to a processable character content architecture consists of one or more sequences of characters. Each pair of successive character sequences is separated by a hard line terminator control function. The last (or only) character sequence may or may not be terminated by a hard line terminator.

If the hard line terminator is omitted at the end of the content of a basic logical component to which another basic logical component is concatenated (see Recommendation T.412), then the last character sequence continues into the content of the next basic logical component. In all other cases, the end of the content of the basic logical component implicitly terminates the last character sequence.

The division into character sequences represents the internal structure of the processable content of a basic logical component. Each character sequence is anonymous, in that no name or identifier is associated with it, and no relationship exists among character sequences except that of sequence.

4.8.3 *Formatted processable content*

Formatted processable content is content that is structured such that it contains both the formatted content and the processable content as subsets. It is identical in structure to the processable content, except that it may contain additional control functions and graphic characters that have been added as a result of the content layout process. It is identical in structure to the formatted content, except that it may contain logical control functions and delimiters.

Thus, formatted processable content can be converted to processable content by deleting (or ignoring) all layout control functions, all occurrences of the delimiters and all control functions and characters within those delimiters.

Alternatively, formatted processable content can be converted to formatted content by deleting (or ignoring) all logical control functions and the delimiters but retaining the control functions and characters within the delimiters.

Note – The conversion of formatted processable content to processable content is a reversible process (providing the same layout constraints are applicable to the content layout process) but converting formatted processable content to formatted content is irreversible.

The formatted view of a basic component conforming to a formatted processable character content architecture consists of one or more lines of characters. Each pair of successive lines is separated by either a hard or soft line terminator. The last (or only) line may or may not be terminated by a hard line terminator; the end of the content of a basic layout component implicitly terminates the last line.

The processable view of a basic component conforming to a formatted processable character content architecture consists of one or more sequences of characters. Each pair of successive character sequences is separated by a hard line terminator. The last (or only) character sequence may or may not be terminated by a hard line terminator.

If the hard line terminator is omitted at the end of the content of a basic logical component to which another basic logical component is concatenated (see Recommendation T.412), then the last character sequence continues into the content of the next basic logical component. In all other cases, the end of the content of the basic logical component implicitly terminates the last character sequence.

Soft line terminators are used as separators between lines within a character sequence. The division into character sequences represents the internal structure of the content of a basic logical component. Each character sequence is anonymous, in that no name or identifier is associated with it, and no relationship exists among character sequences except that of sequence.

5 Character positioning

This section specifies how characters are to be positioned within a basic layout object. The intention is to aid understanding of the presentation attributes and control functions that relate to character positioning.

This section provides for the positioning of any font that is defined in accordance with ISO 9541-5. This section also caters for the positioning of characters pertaining to different fonts within the same basic layout object.

5.1 *Basic concepts*

5.1.1 *Character fonts*

In the context of this part of ISO 8613, the term *graphic character* is used in its abstract sense; that is, this term refers to a number of a set of graphic symbols used for the representation of information. The term *character image* is then used to refer to the rendition of a graphic character on a presentation medium.

A *font* is a set of character images, normally with a common design and size. A set of font attributes is associated with the font as a whole and a set of character attributes is associated with each individual character. These attributes are defined in ISO 9541-5.

The main purpose of the font attributes is for the recipient to identify the font used by the originator and, in case the specified font is not available, the font and character attributes serve as a guidance for the recipient to find an appropriate substitute font among those available.

Further information concerning the designation and invocation of different fonts within a basic object is given in § 6.

5.1.2 *Directions*

In the context of this Recommendation, all directions are expressed as counter-clockwise angles of rotation (in degrees) relative to a specified reference direction (an example is given in Figure 1/T.416).

The *character path* is the direction of progression of successive character images within a line box (defined in § 5.1.7) and is expressed as a direction relative to the horizontal direction of the layout object (see Figure 4/T.416).

The *line progression* is the direction of progression of successive line boxes within the basic layout object and is expressed as a direction relative to the character path (see Figure 11/T.416).

The *character orientation* is the direction of the character baseline (defined in § 5.1.3) relative to the character path.

Only one value for the character path, line progression and character orientation may be specified for a basic component.

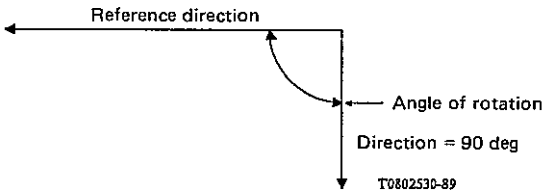


FIGURE 1/T.416

Example of direction

5.1.3 *Character image model*

The *position point* is a reference point associated with a character image (see Figure 2/T.416). It is used for the positioning of the character image within a line box. The *escapement point* is a reference point associated with a character image (see Figure 2/T.416). It is used for the positioning of the next character image.

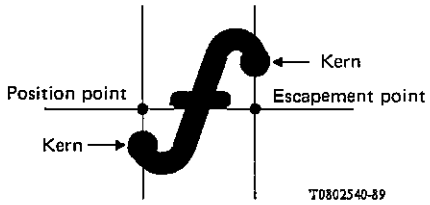


FIGURE 2/T.416

Illustration of kerns

The *character baseline* is an imaginary line across a character image, for the purpose of defining the character orientation. The character baseline is a horizontal lien with the character image is in its intended viewing orientation (see Figure 3/T.416).

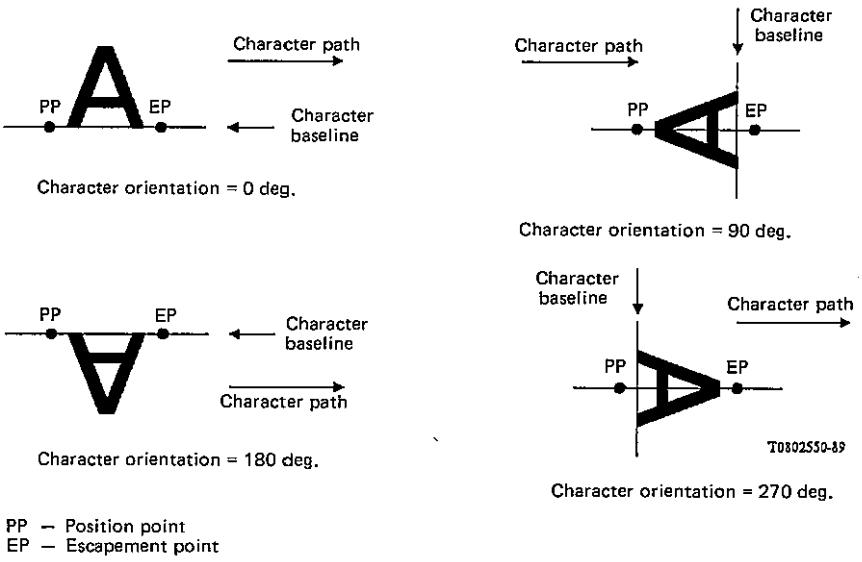


FIGURE 3/T.416

Reference points for character image positioning

A position point and escapement point must be defined for each character orientation which is intended to be used (see Figure 3/T.416); i.e., "writing modes" corresponding to the required character orientation must be defined in the font description, or fall-backs must be defined in document application profiles.

A *kern* is that part of the character image that extends beyond its position and escapement points (see Figure 2/T.416).

5.1.4 *Character spacing*

The concept of character spacing is only applicable when a constant spacing font is selected. It is used (in conjunction with the inter-character space) to determine the distance between character images within a line box as defined in § 5.2.1.

The character spacing is equal to the distance between the position points of successive character images when the inter-character space is zero.

The character spacing is independent of the distance between the position point and escapement point of character images.

5.1.5 *Active position*

The *active position* is an abstraction of an imaging device concept such as a *cursor*. This concept is used in the definitions of control functions (see § 11) where a sequential method of processing a character string is assumed.

at which the action specified by the next character (graphic character or control function) is to be effected.

If the next character is a graphic character, its character image is positioned with the position point at the active position and the active position is advanced in the direction of the character path by the amount of spacing defined in § 5.2.1. If the next character is a control function, this may cause the active position to move to another point within the positioning area.

5.1.6 *Positioning area*

A *positioning area* is a rectangular area, wholly contained within a basic layout object, within which position points and escapement points are to be positioned (see Figure 4/T.416). Kerns of character images are permitted to extend beyond the positioning area but are not permitted to extend beyond the edges of the basic layout object.

Two of the edges of the positioning area are referred to as the *start edge* and *end edge* (see Figure 4/T.416). The start edge and the end edge are defined such that the direction from the start edge to the end edge is in the direction of the character path.

The other two edges of the positioning area are referred to as the *top edge* and *bottom edge* (see Figure 11/T.416). The top edge and the bottom edge are defined such that direction from the top edge to the bottom edge is in the direction of line progression.

The start and end edges are indented from the corresponding edges of the basic layout object by a distance referred to as the *kerning offset* (see Figure 4/T.416). The kerning offset specified depends upon the fonts of the characters to be positioned in the positioning area. Its value is chosen such that no part of any character image with kerns will extend beyond the boundary of the basic layout object when sequences of character images are positioned within it.

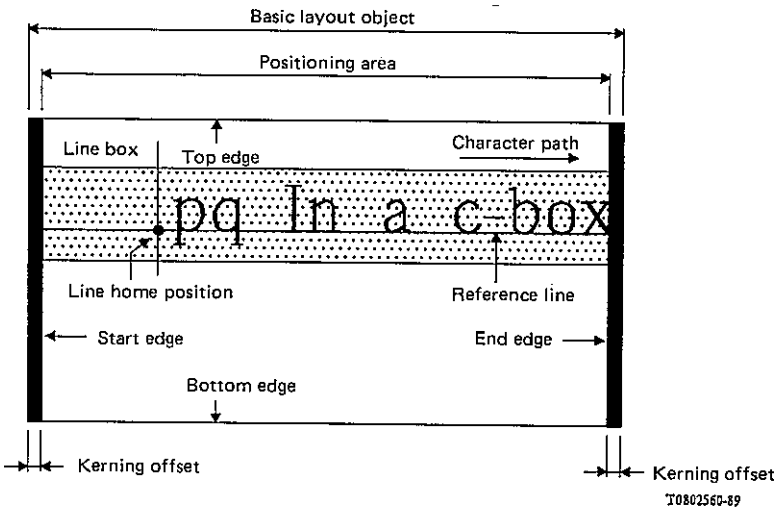


FIGURE 4/T.416

Illustration of character position concepts

5.1.7 *Line boxes*

Within the positioning area, a sequence of character images is positioned within an area, a sequence of character image is positioned within an area called a line box (see Figure 11/T.416). Each *line box* is a rectangular area that extends from the start edge to the end edge of the positioning area.

Each line box contains a reference point called the *line home position* (see Figure 4/T.416). This point is used for positioning the line box within the basic layout object. It also serves as the active position for the first graphic character or control function in each line.

Each line box contains an imaginary line called a *reference line* (see Figure 4/T.416). The reference line passes through the line home position in the direction of the character path. It extends from the start edge to the end edge within the line box and is used for the alignment of character images.

The length of the line box is equal to the distance between the start and end edges. The width (or height) of a line box is equal to the sum of the line box forward extent and the line box backward extent (see Figure 4/T.416). The line box backward extent is the distance between the reference line and the edge of the lien box in the direction opposite to the direction of line progression. The line box forward extent is the distance between the reference line and the edge of the line box in the direction of line progression.

The values of the forward and backward extents depend on the maximum extents (measured perpendicular to the reference line) of the character fonts used in the line box. Determination of the forward and backward extents take into account any displacements of character images perpendicular to the character path, e.g. for subscripts, superscripts and parallel annotation.

Note – As an example, for a Latin font with character path 0 degrees, line progression 270 degrees and when a single font is used in the line box, then the forward and backward extents are equal to the maximum right and maximum left extents for that font as defined in ISO 9541-5.

5.2 *Positioning of character images within a line box*

Successive character images are positioned within a line box in the direction of the character path.

The position points of the character images are lined on the reference line unless the characters are imaged as subscripts, superscripts or parallel annotation.

There are several factors which affect the positioning of character images along the reference line:

- spacing between characters;
- alignment;
- tabulation;

- character ordering;
- parallel annotation;
- subscript/superscript;
- pairwise kerning;
- first line offset;
- itemization.

5.2.1 *Spacing between characters*

The *inter-character* space is an additional amount of spacing between the position points of successive character images, in the direction of the character path (see § 5.1.4). A negative value indicates a reduction in the spacing between successive character images.

The distance between the position points of successive character images may be constant or variable depending upon the font as follows:

- For fonts with *constant spacing*, the distance between the position points of successive character images is independent of the characters and is the sum of the character spacing (as specified by presentation attributes and control functions) and the inter-character space (see Figure 5/T.416).
- For fonts with *variable spacing*, the distance between the position points of successive character images is dependent upon the character i.e. normally the distance between the position point and the escapement point of a character, and is the sum of the net escapement of the character (as specified by the font) and the inter-character space (see Figure 6/T.416).

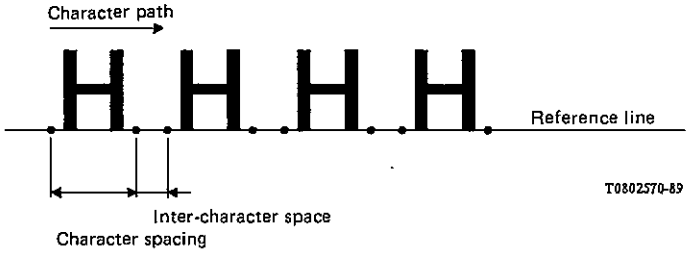


FIGURE 5/T.416

Spacing for a constant spacing font

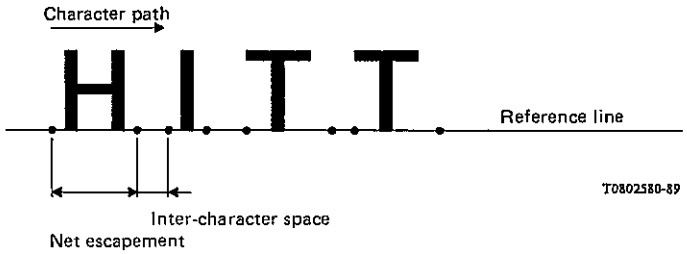


FIGURE 6/T.416

Spacing for a variable spacing font

The space width, i.e. the width of the SP (space) character image, is determined as follows:

- for any SP that follows a soft line terminator and precedes the first graphic character of a line, or precedes a line terminator and follows the last graphic character of a line, the width is equal to zero;
- in a constant spacing font, the default width equals the character spacing;
- in a variable spacing font, the width is implicitly defined by the font;
- for all fonts, the width may be specified by a control function.

5.2.2 *Alignment*

The character images are positioned within a line box in accordance with the alignment attribute as follows:

- *start-aligned:* the position point of the first character image is placed at the line home position;
- *end-aligned:* the escapement point of the last character image is placed at the end edge of the positioning area;
- *centred:* the distance from the line home position to the position point of the first character image is approximately equal to the distance from the escapement point of the last character image to the end edge of the positioning area;
- *justified:* the position point of the first character image is placed at the line home position and the escapement point of the last character image is coincident with the end edge of the positioning area by appropriately setting the space width and/or the inter-character space.

5.2.3 *Tabulation*

The position of character images along a reference line can be controlled by means of a set of tabulation stops. Each tabulation stop specifies a point along a reference line relative to the start edge the positioning area.

A string of character images can be placed at a tabulation stop by means of a control function embedded in the text. The string may be start-aligned, end-aligned, centred or aligned around one or more specified characters within that string as follows (see Figure 7/T.416).

- *start-aligned:* the position point of the first character image of the string is placed at the tabulation stop;
- *end-aligned:* the escapement point of the last character image of the string is placed at the tabulation stop;
- *centred:* the string is placed such that the position point of the first character image and the escapement point of the last character image of the string are approximately equidistant from the tabulation stop;
- *aligned around:* the position point of the first character image of the first instance of the specified group of characters in that string is positioned at the tabulation stop. If the specified group or characters does not appear in the text associated with that tabulation stop, then the alignment defaults to end-aligned as defined above.

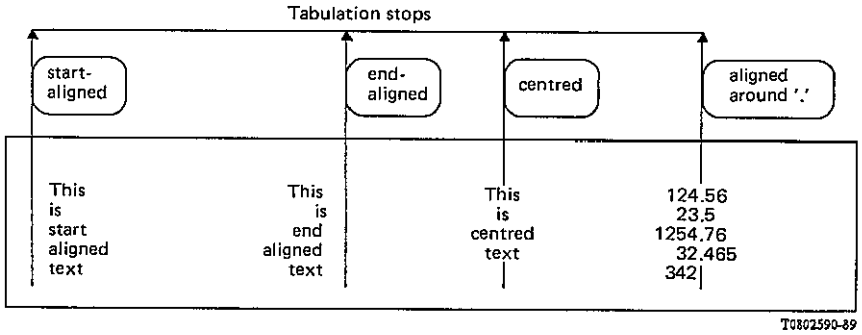


FIGURE 7/T.416

Tabulation

5.2.4 *Character ordering*

Within the content of a basic object, the interchange order is always the reading order of the language used.

In the case of certain languages, e.g. Arabic and Hebrew, where the alphanumeric text is read from right to left and the numeric text is read from left to right, the interchanged stream must indicate the change in presentation direction at the appropriate point(s).

This is necessary since control functions in character content architectures are defined to operate sequentially according to their position in the character stream.

When a string of characters with reversed presentation direction is embedded in the text with normal presentation direction, the image of the last character of the string with reversed presentation direction is positioned adjacent to the image of the last character of the preceding string with normal presentation direction (see Figure 8/T.416).

Note – In Figure 8/T.416 the terms "first" and "last" are used in relation to the interchange order and the terms "normal" and "reversed" in relation to the direction of the character path.

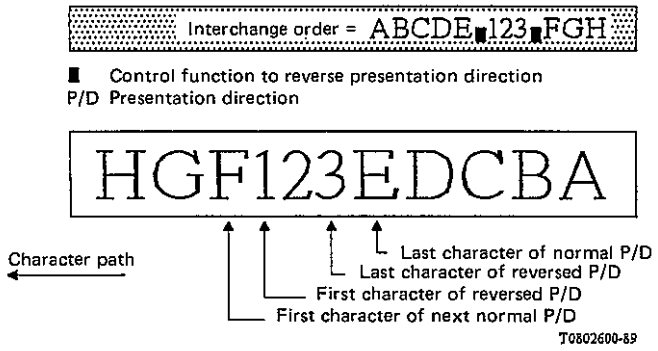


FIGURE 8/T.416

Character ordering

5.2.5 *Parallel annotation*

Two sequential character strings may be delimited such that the second string is used to indicate the pronunciation and interpretation of the first. It is intended to be used in the Japanese language to provide pronunciation and interpretation information (Ruby) in the form of *Kana character(s)* for one or more *Kanji characters*. This is indicated in the formatted text by the Kana character(s) being centered either above or to the right of the Kanji character(s), for character image orientations orthogonal and parallel to the character path respectively (see Figure 9/T.416).

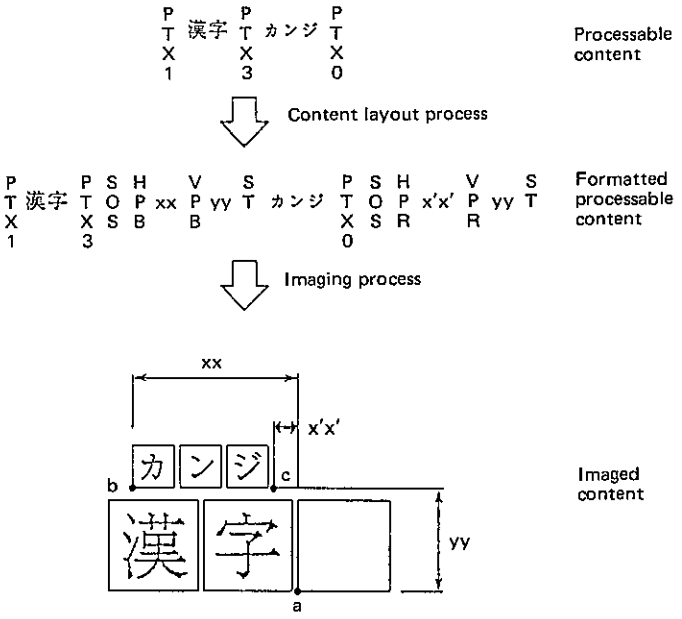
Where centring would result in Kana characters being positioned outside the positioning area, then the Kana character string is positioned such that it is start-aligned or end-aligned with the edge of the available area.

5.2.6 *Subscript/superscript*

Subscript rendition allows for the active position to be displaced from the reference line in the direction of line progression.

Superscript rendition allows for the active position to be displaced from the reference line in the direction opposite to that of line progression.

The combined effect of all subscript/superscript renditions within a line box must be such that the active position is returned to the reference line before the occurrence of a hard or soft line terminator.



Where:

HPB Character position backward;
HPR Character position relative;
VPB Line position backward;
VPR Line position relative;
xx,xw'xw',yy User specified.

The current reference point moves from "a", "b", "c" and returns to "a".

FIGURE 9/T.416

Illustration of parallel annotation

5.2.7 *Pairwise kerning*

Pairwise kerning allows for the moving of the active position from that defined by the preceding character. The distance and direction depend both on the character being imaged and the preceding character.

In the case of a constant spacing font, pairwise kerning is ignored.

In the case of a variable spacing font, the actual distance between the escapement point of one character image and the position point of the next character image is modified by the kerning information as defined in the character attributes of the font.

5.2.8 *First line offset*

First line offset allows for character imaging of the first line of a basic component to start at a position displaced from the line home position.

The offset is either in the direction of the character path (producing first line indentation) or in the direction opposite to the character path (producing overhang) as illustrated in Figure 10/T.416.

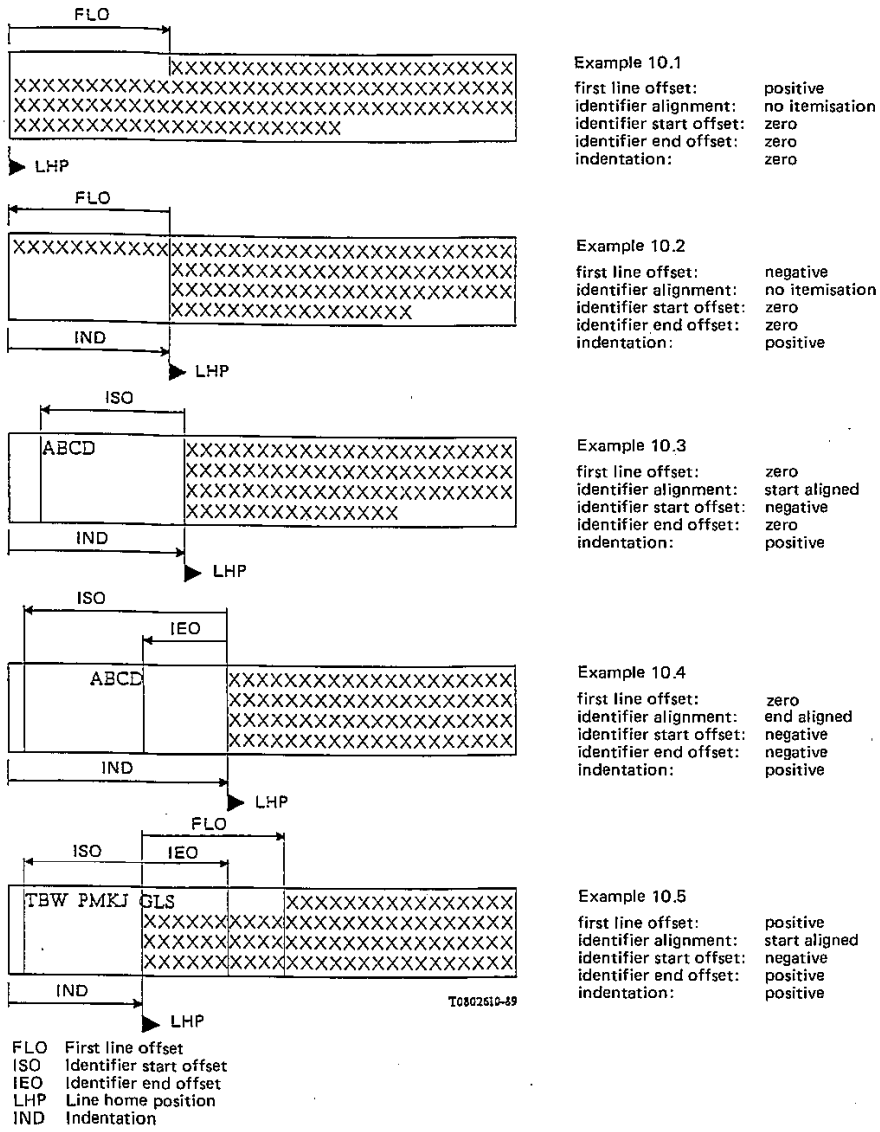


FIGURE 10/T.416

Illustration of itemization and first line offset

5.2.9 Itemization

Itemization allows for imaging of an *item identifier* on the first line of a basic component in positions which are not constrained by the line home position and the first line offset (see Figure 10/T.416).

An item identifier is a string of characters that precedes and is separated from the remainder of the first line of a basic component.

A start offset and an end offset are defined relative to the line home position. These offsets determine the location of the item identifier and the separation between the item identifier and the line home position.

The item identifier may be positioned on the first line in accordance with the item identifier alignment attribute as follows:

- *start-aligned:* the position point of the first character image of the item identifier is place at the start offset;
- *end-aligned:* the escapement point of the last character image of the item identifier is placed at the end offset.

5.3 *Positioning of line boxes within a basic layout object*

For positioning of line boxes in a basic layout object, the area of that object is independent of any adjoining areas. No part of the image is permitted to extend beyond the boundaries of the basic layout object.

The *initial point* is the point relative to which all line boxes are positioned within the basic layout object (see § 7.2.2 and Figure 11/T.416).

The line home position of the first line box is at the initial point of the basic layout object. Subsequent line home positions are located on a line through the initial point in the direction of line progression.

The distance between the line home positions of two successive line boxes is determined as follows:

- when proportional line spacing is to be performed, the distance between the reference lines of two successive line boxes is evaluated by an implementation dependent algorithm not defined in this Recommendation;
- when proportional line spacing is not to be performed, the distance between the reference lines of two successive line boxes is equal to the current line spacing as specified by presentation attributes and control functions.

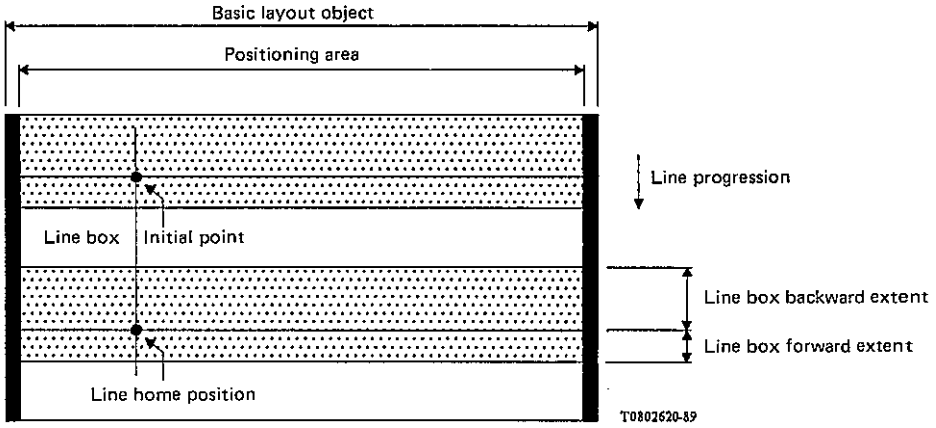


FIGURE 11/T.416

Illustration of line box positioning concepts

6 Character imaging

Four groups of specifications may apply to the imaging of graphic character elements in a basic object, namely those relating to:

- emphasis;
- font selection;
- subscript and superscript;
- character combinations.

These groups of specifications are defined below.

Note 1 – Emphasis (by "weight", "posture" etc.) and subscript/superscript rendition may be achieved by font selection.

Note 2 – Document application profiles may define additional restrictions on the use of the character features defined in this section. In addition, an implementation may replace an imaging feature by an alternative fall-back feature. However, this Recommendation does not define preferred fall-back features. It should also be noted that use of a fall-back feature may cause incorrect or misleading information to be conveyed to the user. It is particularly recommended that a fall-back is not used when the feature "crossed-out" is specified (see § 6.1.6).

6.1 *Emphasis*

Portions of text may be visually differentiated or emphasized in character imaging. Six methods of emphasis are provided:

- weight;
- posture;
- underlining;
- blinking;

- image inversion;
- crossing-out.

All of these may be controlled by means of rendition selection using the presentation attribute "graphic rendition" and the control function SGR (Select Graphic Rendition).

The emphasis takes effect at the active position of the line box where the control function initiates it and ends at the active position of the line box where the control function specifies an end to the emphasis or at the end of the object.

Note – Not all forms of emphasis allowed by this Recommendation are applicable to all presentation devices. For example, in printed text, 'blinking' may not be able to be represented, a second colour may be an available alternative to 'faint' (decreased intensity), but 'image inversion' may only be practicable by the use of appropriately designed cameo fonts.

6.1.1 *Weight*

This provides emphasis or de-emphasis by means of varying the contrast or intensity of the character image.

Using renditions selection, three weights are provided:

- faint (decreased intensity);
- normal intensity (neither faint nor bold);
- bold (increased intensity).

Only one of these may be in effect at any one point in the character stream, so that invoking one resets the others.

6.1.2 *Posture*

This causes a change of posture between an upright font and an italic font.

Using rendition selection, two renditions are provided:

- not italicized;
- italicized.

Only one of these renditions may be in effect at any one point in the character stream, so that invoking one resets the other.

6.1.3 *Underlining*

This provides for underlining character images. Three renditions are provided:

- not underlined;
- underlined;
- doubly underlined.

Only one of these renditions may in effect at any one point in the character stream, so that invoking one resets the others.

Note – For writing systems other than those that use a horizontal writing direction, underlining may be replaced by a suitable emphasis.

6.1.4 *Blinking*

This provides for flashing of the graphic symbol in the line box ON and OFF. Three renditions are provided:

- steady (not blinking);
- slowly blinking;
- rapidly blinking.

Only one of these renditions may by in effect at any one point in the character stream, so that invoking one resets the other.

Note – Slow blinking should be taken as less than 150 ON/OFF cycles per minute and rapid blinking should be taken as more than 150 per minute.

6.1.5 *Image inversion*

This causes the colours of the graphic symbol and the line box to be exchanged. Two renditions are provided:

- positive image;
- negative image.

Only one of these renditions may by in effect at any one point in the character stream, so that invoking one resets the other.

Note – Simple inversion of the pels within the line box area may not be sufficient for inverting the character image.

6.1.6 *Crossing-out*

This allows characters to be marked for deletion. The method of crossing out is not defined but the characters should be legible. Two renditions are provided:

- *not crossed-out;*
- *crossed-out.*

Only one of these renditions may by in effect at any one point in the character stream, so that invoking one resets the other.

6.2 *Font selection*

The capability for font selection is based upon:

- font specification: the required fonts and their characteristics must be specified in the document profile (see Recommendation T.414). There is no limit to the number of fonts that can be specified;
- font designation: a subset of these fonts can be designated for use within a basic component by means of the presentation attribute "character fonts". This subset is limited to a maximum of 10 fonts;
- font invocation: any of the fonts within the subset can be invoked by means of the presentation attribute "graphic rendition" and/or control function SGR (Select Graphic Rendition).

6.2.1 *Font specification*

Within the document profile, there is an attribute "fonts list". This specifies, for each font used in the document:

- a font identifier, represented by an integer, unique within the document;
- a font description consisting of a set of font attributes specifying properties that are common to all characters of the font, e.g. weight, posture, constant or variable spacing, as well as properties that are unique to the individual characters.

The font description includes a structured font name as defined in ISO 9541. The other font attributes allow a recipient to select a suitable substitute font when the font specified by the structured font name is not available.

Note – It is necessary to consider that font designs are typically proprietary, and that, in addition, the recipient may have a limited repertoire. Thus, there can be no assurance that a particular font selected by the originator is actually available at the recipientw's location, unless the originator has prior knowledge of the facilities available to the recipient. Since this would not generally be true in open interchange, it is necessary to specify the font and character characteristics in a manner that facilitates the selection of a near-equivalent alternative, from the repertoire of fonts available to the recipient.

6.2.2 *Font designation*

The presentation attribute "character fonts" enables a subset of up to 10 fonts from the set of fonts specified in the attribute "fonts list" in the document profile to be designated for use within the basic component.

Each font and its size is specified together with the method of invoking the font, i.e. as the primary or one of the alternative fonts.

If no font is designated for the primary font or for a particular alternative font, it is left to the recipient to select a suitable font for the primary or alternative font concerned.

Note – The selection of a substitution font may depend upon the characteristics and capabilities of the presentation device.

6.2.3 *Font invocation*

The control function SGR (Select Graphic Rendition) is used to invoke the primary font or one of the 9 alternative fonts. Such an invocation can be performed anywhere within the content of a basic component.

For the initial conditions at the beginning of the basic component, the font indicated by the presentation attribute "graphic rendition" is invoked. In the absence of this attribute, the primary font is assumed to be invoked. If no fonts have been specified, the font used is implementation dependent.

When a designated font is invoked, any specification of weight or posture by an SGR parameter value, or by the presentation attribute "graphic rendition", is ignored.

Invocation of a character set by way of code extension dose not imply invocation of a font for that character set.

6.3 *Subscript and superscript*

The control functions PLD (Partial Line Down) and PLU (Partial Line Up) provide for characters to be imaged as subscript and superscript respectively.

Finer control of subscript and superscript rendition is provided by the control functions VPB (Line Position Backward) and VPR (Line Position Relative).

6.4 *Character combinations*

Two or more characters can be imaged as if they were a single symbol.

The control function GCC (Graphic Character Composition) within the content identifies the string of characters to be imaged as a single symbol.

7 Definition of character presentation attributes

Presentation attributes are applicable to basic logical and layout components. They specify the initial conditions at the start of the rendition of the content of that basic component. The content architecture associated with each basic component can have the means for changing certain of these presentation attributes by means of control functions embedded in the content; such capabilities are indicated in the definition of each presentation attribute.

The following categories of presentation attributes are defined:

- shared attributes which are available to all character content architecture classes;
- layout attributes which are available to formatted and formatted processable form character content architecture classes;
- logical attributes which are available to processable and formatted processable form character content architecture classes.

These attributes are listed in Table 1/T.416.

For each presentation attribute, a default value is defined. This value is used in the defaulting mechanism as defined in Recommendation T.412.

In addition, values specific to character content architectures are defined for the content architecture class attributes. These attributes are defined in Recommendation T.412.

TABLE 1/T.416

Character presentation attributes

Shared attributes	Layout attributes
Alignment Character fonts Character orientation Character path Character spacing Code extension announcers First line offset Graphic character sets Graphic character subrepertoire Graphic rendition Itemization Kerning offset Line layout table Line progression Line spacing Pairwise kerning	Formatting indicator Initial offset
	Logical attributes
	Indentation Proportional line spacing Orphan size Widow size

7.1 *Shared presentation attributes*

7.1.1 **alignment**

CATEGORY: Shared

PERMISSIBLE VALUES: 'start-aligned'
'end-aligned'
'centred'
'justified'

DEFAULT VALUE: 'start-aligned'

DEFINITION:

This attribute specifies the method of character alignment (see § 5.2.2).

REMARKS:

The character alignment cannot be altered within the content of a basic component. Application of the value 'justified' may be suppressed by an occurrence of the control function JFY (No Justify).

This attribute can be overridden by the presentation attribute "line layout table" when any tabulation stops are specified (see § 7.1.13).

7.1.2 **character fonts**

CATEGORY: Shared

STRUCTURE: 10 pairs of two parameters: font size
font identifier

PERMISSIBLE VALUES: font size: any positive integer
font identifier: any positive integer

DEFAULT VALUES: font size: {none is defined}
font identifier: {none is defined}

DEFINITION:

This attribute designates up to 10 fonts which may be used within the basic component (see § 5.1.2 and 6.2). These fonts are referred to as the primary font, the first alternative font, the second alternative font etc. The fonts designated must be chosen from the fonts listed in the document profile (see Recommendation T.414).

The parameter "font size" specifies the size of the font i.e. the height of the character image; its value is an integer representing the size of the font in SMUs.

The parameter "font identifier" is an integer equal to the font identifier associated with the font in the document profile attribute "fonts list".

REMARKS:

One of the designated fonts may be invoked at the start of the presentation of the content associated with a basic component by means of the presentation attribute "graphic rendition", otherwise the primary font is assumed to be invoked. Also, fonts may be invoked within the content by means of the control function SGR (Select Graphic Rendition).

7.1.3 **character orientation**

CATEGORY: Shared

PERMISSIBLE VALUES: 0, 90, 180, 270 degrees

DEFAULT VALUE: 0 degrees

DEFINITION:

This attribute specifies the character orientation (see § 5.1.3).

REMARKS:

The character orientation cannot be altered within the content of a basic component.

7.1.4 **character path**

CATEGORY: Shared

PERMISSIBLE VALUES: 0, 90, 180, 270 degrees

DEFAULT VALUE: 0 degrees

DEFINITION:

This attribute specifies the character path (see § 5.1.2).

REMARKS:

The character path cannot be altered within the content of a basic component. However, local changes of the relationship between the imaging order of the characters and the interchange order can be specified by the control function SRS (Start Reverse String).

7.1.5 **character spacing**

CATEGORY: Shared

PERMISSIBLE VALUES: Any positive integer

DEFAULT VALUE: The equivalent of 120 BMUs

DEFINITION:

This attribute specifies the character spacing which applies at the beginning of the basic component (see § 5.1.4).

The value of this attribute is an integer specifying the distance in SMUs.

REMARKS:

The character spacing value is only used while a constant spacing font is in use; it has no effect while a variable spacing font is in use.

It can be altered within the content of a basic component by means of the control functions SHS (Select Character Spacing) or SCS (Set Character Spacing).

7.1.6 **code extension announcers**

CATEGORY: Shared

PERMISSIBLE VALUES: The value of this attribute consists of the string of escape sequences, in accordance with ISO 2022, to announce the use of code extension features.

DEFAULT VALUE: The escape sequences announcing the use of the G0 and G2 sets, the G2 set being invoked in columns 10 to 15.

DEFINITION:

This attribute announces the code extension features used in the basic component.

REMARKS:

The set of code extension features announced by this attribute cannot be altered within the content of a basic component.

7.1.7 **first line offset**

CATEGORY: Shared

PERMISSIBLE VALUES: Any integer

DEFAULT VALUE: 0

DEFINITION:

This attribute specifies an offset along the character path from the line home position, measured in SMUs (see § 5.2.8). The offset shall be positive (in the direction of the character path), negative (in the direction opposite to the character path) or zero.

The position identifier by application of this offset to the line home position is used instead of the line home position for the purposes of formatting and imaging the first line of the basic layout object in which the content of the basic logical component is laid out.

REMARKS:

The value of the presentation attribute "indentation" (see § 7.3.1) must be set such that the the resulting displacement of the line home position from the start edge of the positioning area is sufficient to enable overhanging characters to be imaged within the positioning area.

The first line offset cannot be altered within the content of a basic component.

7.1.8 **graphic character sets**

CATEGORY: Shared

PERMISSIBLE VALUES: The value of this attribute consists of the string of escape sequences, in accordance with ISO 2022 and the register of ISO 2375, to designate one or more graphic character sets, and any locking shift functions needed to invoke these character sets.

DEFAULT VALUE: The escape sequences and shift functions designating and invoking the primary character set of ISO 6937/2 as the G0 set and the supplementary character set of ISO 6937/2 as the G2 set in columns 10 to 15.

DEFINITION:

This attribute specifies the graphic character set(s) designated and/or invoked at the beginning of the basic component.

REMARKS:

Other graphic character sets can be designated and/or invoked within the content of a basic component by means of the appropriate code extension escape sequences and shift functions.

7.1.9 **graphic character subrepertoire**

CATEGORY: Shared

PERMISSIBLE VALUES: The value of this attribute is either 0 or the identifier of a subrepertoire assigned in the register of ISO 7350. The value 0 identifiers the full repertoire of the graphic character sets that are designated at the beginning of the basic component.

DEFAULT VALUE: 0

DEFINITION:

This attribute identifies the subrepertoire of the graphic character repertoire of ISO 6937 used at the beginning of the basic component.

REMARKS:

This attribute is only applicable if the graphic character sets of ISO 6937 are used.

Other graphic character subrepertoires can be invoked within the content of a basic component by means of the control function IGS (Identify Graphic Subrepertoire).

7.1.10 **graphic rendition**

CATEGORY: Shared

PERMISSIBLE VALUE: A sequence of one or more integers corresponding to parameter values of the control function SGR (Select Graphic Rendition).

DEFAULT VALUE: 0

DEFINITION:

This attribute specifies the rendition parameters for font, underlining, etc., which apply at the beginning of the basic component (see § 6.1).

REMARKS:

The graphic rendition can be altered within the content of a basic component by means of the control function SGR (Select Graphic Rendition).

Note – If more than one graphic rendition parameter is encoded, then it is the user's responsibility to ensure that they are consistent.

7.1.11 **itemization**

CATEGORY: Shared

STRUCTURE: Three parameters:
- identifier alignment;
- identifier start offset;
- identifier end offset.

PERMISSIBLE VALUES: Identifier alignment:
- 'no itemization';
- 'start-aligned';
- 'end-aligned'.

Identifier start offset: any integer value
Identifier end offset: any integer value

DEFAULT VALUES: Identifier alignment: "no itemization"
Identifier start offset: the distance from the line home position to the start edge of the positioning area
Identifier end offset: 0

DEFINITION:

This attribute specifies the placement of an item identifier which shall begin the basic component (see § 5.2.9).

If the value of the parameter "identifier alignment" is "no itemization", then no item identifier is present.

For other values of the parameter "identifier alignment", the parameters "identifier start offset" and "identifier end offset" specify offsets, in SMUs, from the line home position along the character path which identify, respectively, the start edge and end edge of a portion of the line box in which the item identifier will be formatted. These offsets may be positive (in the direction of the character path), negative (in the direction opposite to the character path) or zero.

The item identifier consists of all graphic characters preceding the first occurrence of the control function CR (Carriage Return) in the basic component. The content of the basic component following that CR shall be formatted as specified by the presentation attribute "first line offset".

Values of the parameter "identifier alignment" other then "no itemization" specify the method of character alignment for the item identifier.

REMARKS:

The value of the presentation attribute "indentation" (see § 7.3.1) must be set such that the resulting displacement of the line home position from the start edge of the positioning area is sufficient to enable the item identifier to be imaged within the positioning area.

Itemization cannot be altered within the content of a basic component.

7.1.12 **kerning offset**

CATEGORY: Shared

STRUCTURE: Two parameters: start edge offset, end edge offset

PERMISSIBLE VALUES: Start edge offset: any non-negative integer
End edge offset: any non-negative integer

DEFAULT VALUES: Start edge offset: 0
End edge offset: 0

DEFINITION:

This attribute specifies the kerning offset as a pair of integer values in SMUs (see § 5.1.6). The parameter "start edge offset" specifies in distance from the edge of the basic layout object to the start edge of the positioning area. The parameter "end edge offset" specifies the distance from the edge of the basic layout object to the end edge of the positioning area.

REMARKS:

The kerning offset cannot be altered within the content of a basic component.

7.1.13 **line layout table**

CATEGORY: Shared

STRUCTURE: Four parameters: tab reference
tab position
alignment
alignment string

PERMISSIBLE VALUES: Tab reference: a string of one to four decimal digits used as the reference parameter in the control function STAB (Selective Tabulation).

Tab position: any non-negative integer

Alignment: 'start-aligned'
'end-aligned'
'centred'
'aligned-around'

Alignment string: graphic characters from the set of graphic elements specified by the presentation attributes "graphic character sets" and "graphic character subreper- toire".

DEFAULT VALUES: The default values are such that no tabulation stops are defined.

DEFINITION:

This attribute specifies the positions and types of a sequence of tabulation stops (see § 5.2.3). The value of the parameter "tab position" specifies the distance in SMUs, in the direction of the character path, from the start edge of the positioning area to the tabulation stop.

REMARKS:

When this presentation attribute specifies any tabulation stops, the presentation attribute "alignment" is assumed to have the value w'start-alignedw' (see § 7.1.1).

The parameter "alignment string" is only present if the value of the parameter "alignment" is w'aligned-aroundw'.

The tabulation stops cannot be altered within the content of a basic component.

7.1.14 **line progression**

CATEGORY: Shared

PERMISSIBLE VALUES: 90, 270 degrees

DEFAULT VALUE: 270 degrees

This attribute specifies the line progression (see § 5.1.2).

REMARKS:

The line progression cannot be altered within the content of a basic component.

7.1.15 **line spacing**

CATEGORY: Shared

PERMISSIBLE VALUES: Any positive integer

DEFAULT VALUE: The equivalent of 200 BMUs

DEFINITION:

This attribute only applies when proportional line spacing is not to be done by the content layout process. In this case, it specifies the line spacing which applies at the beginning of the basic component (see § 5.3).

The value of this attribute is an integer specifying the distance in SMUs.

REMARKS:

The line spacing can be altered within the content of a basic component by means of the control functions SVS (Select Line Spacing) or SLS (Set Line Spacing).

7.1.16 **pairwise kerning**

CATEGORY: Shared

PERMISSIBLE VALUES: 'Yes'
'No'

DEFAULT VALUE: 'No'

DEFINITION:

This attribute specifies whether pairwise kerning should be performed on the content during the formatting process (see § 5.2.7).

The value w'yesw' indicates that the formatting process should perform, if possible, pairwise kerning to the content.

The value w'now' specifies that pairwise kerning should not be performed on the content.

REMARKS:

The specification of pairwise kerning cannot be altered within the content of a basic component.

7.2 *Layout presentation attributes*

7.2.1 **formatting indicator**

CATEGORY: Layout

PERMISSIBLE VALUES: 'Yes'
'No'

DEFAULT VALUE: 'No'

DEFINITION:

This attribute specifies whether the content of a basic component has been formatted by a content layout process or not.

The value w'yesw' indicates that the content of the basic layout component concerned contains layout control functions representing the effects of any use of the control function STAB (Selective Tabulation) or of the presentation attributes "alignment", "first line offset", "itemization" and/or "pairwise kerning" (see § 12.2.1.3.1).

REMARKS:

The specification of alignment cannot be altered within the content of a basic component.

Note – In interchange, a recipient can take advantage of this attribute only if he has a character font that is similar to that of the sender, i.e. a font that has the same width for each character as the sender's font.

7.2.2 **initial offset**

CATEGORY: Layout

STRUCTURE: Two parameters: horizontal coordinate
vertical coordinate

PERMISSIBLE VALUES: Horizontal coordinate: any non-negative integer
Vertical coordinate: any non-negative integer

DEFAULT VALUES: The default values of this attribute depend on character path, line progression and line spacing as defined in Table 2/T.416.

TABLE 2/T.416

Default values of the presentation attribute "initial offset"

Character path	Line progression	Horizontal coordinate	Vertical coordinate
0	270 90	0 0	S H-S
90	270 90	S W-S	H H
180	270 90	W W	H-S S
270	270 90	W-S S	0 0

W Horizontal dimension of basic component
H Vertical dimension of basic component
S Backward extent of first line box

DEFINITION:

This attribute specifies the position of the initial point (see § 5.3).

The values of the parameters "horizontal coordinate" and "vertical coordinate" specify the horizontal and vertical coordinates, in SMUs, of the initial point relative to the top left corner of the basic component. The horizontal coordinate is measured positively from the vertical axis to the right and the vertical coordinate is measured positively from the horizontal axis downwards.

REMARKS:

The position of the initial point cannot be altered within the content of a basic component.

7.3 *Logical presentation attributes*

7.3.1 **indentation**

CATEGORY: Logical

PERMISSIBLE VALUES: Any non-negative integer

DEFAULT VALUE: 0

DEFINITION:

This attribute specifies the distance, in the direction of character path from the start edge of the positioning area, to the initial point of the basic layout object in which the content of the basic logical component is laid out (see Figure 10/T.416). The distance is specified in SMUs.

REMARKS:

The indentation cannot be altered within the content of a basic component.

7.3.2 **orphan size**

CATEGORY: Logical

PERMISSIBLE VALUES: Any positive integer

DEFAULT VALUE: 1

DEFINITION:

This attribute only applies when the content layout process would result in the basic logical object being laid out in two or more basic layout objects; for example, at a page or frame boundary.

The value of this attribute specifies the minimum number of lines of content that must be placed in the first basic layout object.

If the number of lines remaining in the first basic layout object is less than the value of this attribute, all the content laid out in subsequent layout objects.

REMARKS:

The orphan size cannot be altered within the content of a basic component.

7.3.3 **proportional line spacing**

CATEGORY: Logical

PERMISSIBLE VALUES: 'Yes'
'No'

DEFAULT VALUE: 'No'

DEFINITION:

This attribute specifies how the content layout process is to determine the distance between the reference lines of two successive line boxes.

If the value is w'yesw', the line spacing is variable and the content layout process takes into account the forward extent of the first line box and the backward extent of the second line box.

If the value is w'now', the line spacing does not depend on the content of the line boxes but is determined from values set by the presentation attribute "line spacing" or the control functions SLS (Set Line Spacing) and SVS (Select Line Spacing).

7.3.4 **widow size**

CATEGORY: Logical

PERMISSIBLE VALUES: Any positive integer

DEFAULT VALUE: 1

DEFINITION:

This attribute only applies when the content layout process would result in the basic logical object being laid out in two or more basic layout objects; for example, at a page or frame boundary.

The value of this attribute specifies the minimum number of lines of content that must be placed in the last basic layout object.

If the number of lines in the last basic layout object is less than the value of this attribute, sufficient lines shall be moved from the end of the previous basic layout object to meet this requirement.

7.4 *Content architecture class attributes*

7.4.1 *Content architecture class*

The value of the attribute "content architecture class" of a basic component description that conforms to this Recommendation is an ASN.1 object identifier with one of the following values:

{ 2 8 2 6 0 } for the formatted content architecture class;

{ 2 8 2 6 1 } for the processable content architecture class;

{ 2 8 2 6 2 } for the formatted processable content architecture class.

7.4.2 *Content type*

The content architecture class attribute "content type" cannot be used to specify any of the content architecture classes defined in this Recommendation.

7.5 *Interactions between presentation attributes and layout directives*

The attribute "concatenation" of the document architecture (see Recommendation T.412) is applicable to content portions belonging to the same character content architecture class. When concatenation is in effect, as a result of the layout directive "concatenation", then, for the following presentation attributes:

- alignment,
- character fonts,
- character orientation,
- character path,
- first line offset,
- indentation,
- itemization,
- kerning offset,
- line layout table,
- line progression,
- orphan size,
- pairwise kerning,
- widow size,

any value that is specified for the first component of the concatenated sequence applies to all components in the sequence. Thus, in the case of presentation attributes, the values specified for the first component override the values for the other components in the sequence.

8 Character content portion attributes

8.1 *Common coding attributes*

The value of the attribute "type of coding" of a content portion description that conforms to this Recommendation is an ASN.1 object identifier with the value { 2 8 3 6 0 }.

8.2 *Other coding attributes*

No other coding attributes are defined for content portions conforming to this Recommendation.

9 Formal definitions of character content architecture dependent data types

9.1 *Introduction*

This paragraph contains the formal definitions, in ASN.1 notation (defined in ISO 8824), of the data types that are character content architecture dependent.

These data types are:

- the data type to represent the character content architecture specific presentation attributes in basic components, presentation styles and default value lists;
- the data type to represent the character content architecture specific coding attributes in content portions;
- the data type to represent the non-basic values of the character content architecture presentation attributes and control function parameters in the document profile;
- the data type to represent the non-basic values of the character content architecture coding attributes in the document profile;
- the data type to represent the non-standard default values of the character content architecture presentation and coding attributes in the document profile.

9.2 *Representation of presentation attributes*

The data type "Character-Attributes" contains a set of subordinate data types that specify the character presentation attributes. Some of these subordinate data types are elementary but others are structured and are themselves made up of subordinate data types. The format of these data types is given below.

The subset of subordinate data types that may occur within a particular instance of the data type "Character-Attributes" depends upon the particular character content architecture level that is specified.

```
Character-Presentation-Attributes { 2 8 1 6 2 }

  DEFINITIONS          ::= BEGIN

    EXPORTS            Character-Attributes,
                       One-Of-Four-Angles,
                       One-Of-Two-Angles,
                       Alignment,
                       Graphic-Rendition,
                       Kerning-Offset,
                       Proportional-Line-Spacing,
                       Pairwise-Kerning;

Character-Attributes   ::= SET {
    character-path                  [0]   IMPLICIT One-Of-Four-Angles OPTIONAL,
    line-progression                [1]   IMPLICIT One-Of-Two-Angles OPTIONAL,
    character-orientation           [2]   IMPLICIT One-Of-Four-Angles OPTIONAL,
    initial-offset                  [3]   IMPLICIT Measure-Pair OPTIONAL,
    character-spacing               [6]   IMPLICIT INTEGER OPTIONAL,
    line-spacing                    [7]   IMPLICIT INTEGER OPTIONAL,
    alignment                       [8]   IMPLICIT Alignment OPTIONAL,
    line-layout-table               [9]   IMPLICIT Layout-Table OPTIONAL,
    graphic-rendition               [10]  IMPLICIT Graphic-Rendition OPTIONAL,
    formatting-indicator            [11]  IMPLICIT Formatting-Indicator OPTIONAL,
    character-fonts                 [12]  IMPLICIT Character-Fonts OPTIONAL,
    graphic-char-subrepertoire      [13]  IMPLICIT INTEGER OPTIONAL,
    itemization                     [14]  IMPLICIT Itemization OPTIONAL,
    widow-size                      [15]  IMPLICIT INTEGER OPTIONAL,
    orphan-size                     [16]  IMPLICIT INTEGER OPTIONAL,
    graphic-character-sets          [17]  IMPLICIT OCTET STRING OPTIONAL,
    indentation                     [19]  IMPLICIT INTEGER OPTIONAL,
    kerning-offset                  [20]  IMPLICIT Kerning-Offset OPTIONAL,
    proportional-line-spacing       [21]  IMPLICIT Proportional-Line-spacing OPTIONAL,
    pairwise-kerning                [22]  IMPLICIT Pairwise-Kerning OPTIONAL,
    first-line-offset               [23]  IMPLICIT INTEGER OPTIONAL,
    coding extension announcers     [24]  IMPLICIT OCTET STRING OPTIONAL }

One-Of-Four-Angles     ::= INTEGER    { d0     (0),
                                        d90    (1),
                                        d180   (2),
                                        d270   (3) }

One-Of-Two-Angles      ::= INTEGER    { d90    (1),
                                        d270   (3) }
```

```
Measure-Pair            ::= SEQUENCE {
   horizontal                   [0]         IMPLICIT INTEGER,
   vertical                     [0]         IMPLICIT INTEGER }

Alignment               ::= INTEGER     { start-aligned     (0),
                                          end-aligned       (1),
                                          centred           (2),
                                          justified         (3) }

Layout-Table            ::= SET OF Tabulation-Stop

Tabulation-Stop         ::= SET {

   tabulation-reference         [0]         IMPLICIT NumericString,

   tabulation-position          [1]         IMPLICIT INTEGER,

   alignment                    [2]         IMPLICIT INTEGER {
                                              start-aligned     (0),
                                              end-aligned       (1),
                                              centred           (2),
                                              aligned-around    (3) }

   alignment-character-string   [3]     IMPLICIT OCTET STRING }
                                        -- string of graphic characters from the set of
                                        -- graphic elements specified by the presentation
                                        -- attributes "graphic character sets" and
                                        -- "graphic character subrepertoire"

Graphic-Rendition       ::= SET OF Graphic-Rendition-Aspect

Character-Fonts         ::= SET {

   primary-font                 [0]         IMPLICIT Font-Type OPTIONAL,
   first-alternative-font       [1]         IMPLICIT Font-Type OPTIONAL,
   second-alternative-font      [2]         IMPLICIT Font-Type OPTIONAL,
   third-alternative-font       [3]         IMPLICIT Font-Type OPTIONAL,
   fourth-alternative-font      [4]         IMPLICIT Font-Type OPTIONAL,
   fifth-alternative-font       [5]         IMPLICIT Font-Type OPTIONAL,
   sixth-alternative-font       [6]         IMPLICIT Font-Type OPTIONAL,
   seventh-alternative-font     [7]         IMPLICIT Font-Type OPTIONAL,
   eighth-alternative-font      [8]         IMPLICIT Font-Type OPTIONAL,
   ninth-alternative-font       [9]         IMPLICIT Font-Type OPTIONAL }

Font-Type               ::= SET {

   font-size                    [0]         IMPLICIT INTEGER,
   font-identifier              [1]         IMPLICIT INTEGER }

Graphic-Rendition-Aspect ::= INTEGER {

                                             cancel                 (0),
                                             increased-intensity    (1),
                                             decreased-intensity    (2),
                                             italicized             (3),
                                             underlined             (4),
                                             slowly-blinking        (5),
                                             rapidly-blinking       (6),
                                             negative-image         (7),
                                             crossed-out            (9),
                                             primary-font           (10),
                                             first-alternative-font (11),
                                             second-alternative-font (12),
                                             third-alternative-font (13),
                                             fourth-alternative-font (14),
                                             fifth-alternative-font (15),
                                             sixth-alternative-font (16),
                                             seventh-alternative-font (17),
                                             eighth-alternative-font (18),
```

```
                                        ninth-alternative-font  (19),
                                        doubly-underlined       (21)
                                        normal-intensity        (22),
                                        not-italicized          (23),
                                        not-underlined          (24),
                                        steady                  (25),
                                        variable-spacing        (26),
                                        positive-image          (27),
                                        not-crossed-out         (29),
                                        not-variable-spacing    (50) }

Formatting-Indicator        ::= INTEGER { no (0), yes (1) }

Itemization                 ::= SET {

  identifier-alignment          [0]   IMPLICIT INTEGER {
                                        no-itemization  (0),
                                        start-aligned   (1),
                                        end-aligned     (2) }

  identifier-start-offset       [1]   IMPLICIT INTEGER OPTIONAL,
  identifier-end-offset         [2]   IMPLICIT INTEGER OPTIONAL }

Kerning-Offset              ::= SET {

  start-offset                  [0]   IMPLICIT INTEGER,
  end-offset                    [1]   IMPLICIT INTEGER }

Proportional-Line-Spacing   ::= INTEGER { no (0), yes (1) }
Pairwise-Kerning            ::= INTEGER { no (0), yes (1) }

  END
```

9.3 *Representation of coding attributes*

```
Character-Coding-Attributes ::= { 2 8 1 6 3 }

  DEFINITIONS               ::= BEGIN

    EXPORTS Character-Coding-Attributes;

    Character-Coding-Attributes  ::= SET { }

                        --  no character coding attributes are defined
                        --  in this part of ISO 8613

  END
```

9.4 *Representation of non-basic features and non-standard defaults*

```
Character-Profile-Attributes { 2 8 1 6 4 }

  DEFINITIONS               ::= BEGIN

  EXPORTS  Char-Presentation-Feature,
           Character-Coding-Attribute,
           Character-Content-Defaults;

  IMPORTS  One-Of-Four-Angles,
           One-Of-Two-Angles,
           Alignment,
           Graphic-Rendition,
           Kerning-Offset,
           Proportional-Line-Spacing,
           Pairwise-Kerning;
           FROM Character-Presentation-Attributes;

                        --  see § 9.2
```

```
Char-Presentation-Feature       ::= CHOICE {
   character-path                       [0]   IMPLICIT One-Of-Four-Angles,
   line-progression                     [1]   IMPLICIT One-Of-Two-Angles,
   character-orientation                [2]   IMPLICIT One-Of-Four-Angles,
   character-spacing                    [6]   IMPLICIT INTEGER,
   line-spacing                         [7]   IMPLICIT INTEGER,
   alignment                            [8]   IMPLICIT Alignment,
   graphic-rendition                    [10]  IMPLICIT Graphic-Rendition OPTIONAL,
   graphic-char-subrepertoire           [13]  IMPLICIT INTEGER,
   graphic-character-sets               [17]  IMPLICIT OCTET STRING }

Character-Coding-Attribute      ::= NULL

                                    --    no character coding attributes are defined
                                    --    in this Recommendation.

Character-Content-Defaults      ::= SET {

   character-path                       [0]   IMPLICIT One-Of-Four-Angles OPTIONAL,
   line-progression                     [1]   IMPLICIT One-Of-Two-Angles OPTIONAL,
   character-orientation                [2]   IMPLICIT One-Of-Four-Angles OPTIONAL,
   character-spacing                    [6]   IMPLICIT INTEGER OPTIONAL,
   line-spacing                         [7]   IMPLICIT INTEGER OPTIONAL,
   alignment                            [8]   IMPLICIT Alignment OPTIONAL,
   graphic-rendition                    [10]  IMPLICIT Graphic-Rendition OPTIONAL,
   graphic-char-subrepertoire           [13]  IMPLICIT INTEGER OPTIONAL,
   widow-size                           [15]  IMPLICIT INTEGER OPTIONAL,
   orphan-size                          [16]  IMPLICIT INTEGER OPTIONAL,
   graphic-character-sets               [17]  IMPLICIT OCTET STRING OPTIONAL,
   indentation                          [19]  IMPLICIT INTEGER OPTIONAL,
   kerning-offset                       [20]  IMPLICIT Kerning-Offset OPTIONAL,
   proportional-line-spacing            [21]  IMPLICIT Proportional-Line-spacing OPTIONAL,
   pairwise-kerning                     [22]  IMPLICIT Pairwise-Kerning OPTIONAL }

   END
```

10 Graphic characters

The set of graphic characters used in the content of a basic component, and their coded representations, are specified by the presentation attributes "graphic character sets" and "graphic character subrepertoire" and the associated control functions, viz. the code extension control functions and the control function IGS (Identify Graphic Subrepertoire) as described below:

- graphic character sets: this presentation attribute specifies the graphic character sets designated and/or invoked at the beginning of the basic component. The specification of the graphic character sets by this attribute implies the definition of a repertoire of graphic characters and of a unique coded representation for each character of that repertoire;
- graphic character subrepertoire: this presentation attribute can be used, when the graphic character sets designated are those of ISO 6937, to restrict the repertoire of graphic characters to a subset of the repertoire implied by the specification of the graphic character sets. Use of this attribute does not affect the coded representations of the graphic characters;
- code extension control functions: these control functions can be used within the content of a basic component to alter the designations and/or invocations of graphic character sets from those specified by the presentation attribute "graphic character sets";
- IGS (Identify Graphic Subrepertoire): this control function can be used within the content of a basic component, when the graphic character sets designated are those of ISO 6937, to alter the subrepertoire from that specified by the presentation attribute "graphic character subrepertoire".

When the presentation attributes "graphic character sets" and "graphic character subrepertoire" are not specified for a basic component, their values are determined using the defaulting mechanism defined in Recommendation T.412, as for any other presentation attribute.

11 Definition of control functions and the character SPACE

Control functions are classified in the following four categories:

- shared control functions, including code extension control functions, which are available to all classes of character content architecture;
- layout control functions which are available only to formatted form and formatted processable form character content architectures;
- logical control functions which are available only to processable form and formatted processable form character content architectures;
- delimiters which are used to delimit graphic characters and/or shared control functions introduced as a result of a formatting process. The delimiters are available only to formatted processable form character content architectures.

The control functions in these four categories are defined in § 11.1 to 11.4 respectively, § 11.5 defines the character SPACE. The allocation of control functions to categories is summarized in Table 3/T.416.

Control functions that have not been included explicitly in this section are:

- the sequence introducers ESC (Escape) and CSI (Control Sequence Introducer) that are permitted to be used in the character content architecture when required to represent a graphic character or a control function;
- line terminators:
  a) a soft line terminator is represented by the control function CR (Carriage Return) then LF (Line Feed), in that order, where the CR and LF are enclosed between a pair of delimiters SOS (Start Of String) and ST (String Terminator);
  b) a hard line terminator is represented by a control function LF (Line Feed) that immediately follows either a control function CR (Carriage Return) or another LF where the entire sequence of CR and LF(s) is NOT enclosed between a pair of delimiters SOS (Start Of String) and ST (String Terminator).

11.1 *Shared control functions*

11.1.1 *CR – Carriage return*

A control function which causes the active position to be moved to the line home position but not to be moved in the direction of lien progression.

Note – CR is used in conjunction with the control function LF (Line Feed) to move the active position to the line home position at the beginning of a new line of text. It is also used to move the active position to the line home position, for example, after an item identifier (see § 7.1.11). CR should not be used to cause character images to be superimposed.

TABLE 3/T.416

Control functions

Shared control functions

CR	Carriage return
GCC	Graphic character composition
IGS	Identify graphic subrepertoire
LF	Line feed
PLD	Partial line down
PLU	Partial line up
SCS	Set character spacing
SGR	Select graphic rendition
SHS	Select character spacing
SLS	Set line spacing
SRS	Start reverse string
STAB	Selective Tabulation
SUB	Substitute Character
SVS	Select line spacing
VPB	Line position backward
VPR	Line position relative
	Code extension control functions

Layout control functions

BS	Backspace
HPB	Character position backward
HPR	Character position relative
JFY	No justify
SACS	Set additional character separation
SRCS	Set reduced character separation
SSW	Set SPACE width

Logical control functions

BPH	Break permitted here
NBH	No break here
PTX	Parallel texts

Delimiters

SOS	Start of string
ST	String terminator

11.1.2 *GCC - Graphic character composition*

A control function with one parameter which specifies that two or more graphic characters are to be combined into one graphic symbol.

The value of the parameter is 0, 1 or 2.

GCC with the parameter value 0 indicates that the following two graphic characters are to be presented as a single symbol.

GCC with the parameter value 1 indicates the start and GCC with the parameter value 2 indicates the end of a string of graphic characters that are to be presented as a single symbol.

The default value of the parameter is 0.

11.1.3 *IGS – Identify graphic subrepertoire*

A control function with a selective parameter which is used to indicate that a subrepertoire of the graphic character repertoire of ISO 6937 is used in the text. All graphic character sets that are used to represent the indicated graphic character subrepertoire must be explicitly or implicitly designated, but need not be invoked, prior to the occurrence of IGS.

The identification f the graphic character subrepertoire may be changed at any point within a document and becomes effective immediately. No graphic characters other than those of the specified subrepertoire shall be used in the text following the occurrence of IGS. The effect of a graphic character subrepertoire identification ceases upon the next occurrence of:

- another IGS;
- the end of the current basic object;
- the designation of any graphic character set.

The default value of the parameter is zero.

A non-zero parameter value is the identifier assigned to a subrepertoire if the repertoire of ISO 6937 in accordance with the registration procedure specified in ISO 7350.

The parameter value zero identifiers the entire repertoire of the currently designated graphic character sets.

In the absence of IGS, the subrepertoire identified by the presentation attribute "graphic character subrepertoire" applies or the entire repertoire of the currently designated graphic character sets otherwise.

Note – The use of IGS in document application profiles based on the T.410 Series is deprecated. IGS is included in this part of ISO 8613 only for compatibility with some existing applications such as those based upon Recommendation T.61 (1984).

11.1.4 *LF – Line feed*

A control function which causes the active position to be advanced in the direction of line progression but not to be moved in the direction of the character path. The amount of movement is that specified by the most recent occurrence either of the control functions SLS (Set Line Spacing) or SVS (Select Line Spacing) if any, or otherwise by the presentation attribute "line spacing".

LF is restricted to be used in the following cases:

- at the beginning of the content of a basic layout component;
- immediately following a control function CR (Carriage Return);
- immediately following another LF.

11.1.5 *PLD – Partial line down*

A control function which causes either the start of subscript rendition or the end of superscript rendition of graphic characters.

When superscript rendition is in effect, it is terminated by PLD; otherwise, subscript rendition is initiated by PLD.

Any occurrence of PLD to start subscript rendition shall be followed by a control function PLU (Partial Line Up) in the same line before another PLD or control function LF (Line Feed) is used. PLD does not affect the position of any (graphic) lines used to implement the graphic rendition 'underlined', 'crossed-out' or 'doubly underlined' when such a graphic rendition is in effect prior to the occurrence of PLD.

Note 1 – The implementation of the subscript rendition initiated by PLD may be accomplished with special character fonts and/or movement of the active position not exceeding a half line space.

Note 2 – The graphic rendition 'underlined' may have been effected, prior to the occurrence of PLD, either by the control function SGR (Select Graphic Rendition) or by the non-spacing underline character (see ISO 6937).

11.1.6 *PLU – Partial line Up*

A control function which causes either the start of superscript rendition of graphic characters.

When subscript rendition is in effect, it is terminated by PLU; otherwise, superscript rendition is initiated by PLU.

Any occurrence of PLU to start superscript rendition shall be followed by a control function PLD (Partial Line Down) in the same line before another PLU or control function LF (Line Feed) is used.

PLU does not affect the position of any (graphic) lines used to implement the graphic rendition 'underlined', 'crossed-out' or 'doubly underlined' when such a graphic rendition is in effect prior to the occurrence of PLU.

Note 1 – The implementation of the subscript rendition initiated by PLU may be accomplished with special character fonts and/or movement of the active position not exceeding a half line space.

Note 2 – The graphic rendition 'underlined' may have been effected, prior to the occurrence of PLU, either by the control function SGR (Select Graphic Rendition) or by the non-spacing underline character (see ISO 6937).

11.1.7 *SCS – Set character spacing*

A control function with one numeric parameter which specifies the character spacing to be applied to constant spacing fonts in subsequent text.

The specified character spacing takes effect immediately and remains in effect until it is changed by a subsequent occurrence of either SCS or the control function SHS (Select Character Spacing) in the current basic component.

The character spacing is expressed as an integral multiple of SMUs.

The default value of the parameter is the equivalent of 120 BMUs.

11.1.8 *SGR – Select graphic rendition*

A control function with one or more selective parameters which specify one or more graphic rendition aspects for graphic characters and space characters in the subsequent text. The specified graphic rendition(s) takes effect immediately and remains in effect until a subsequent occurrence of SGR in the basic object.

The meaning of the parameter value is shown in Table 4/T.416.

The default value of the parameter is 0.

Any graphic rendition aspect specified by an occurrence of SGR, with the exceptions as noted in Notes 2 and 3 below, is combined with the graphic rendition aspects that are in effect prior to that occurrence of SGR as a result of either an earlier occurrence of SGR or the presentation attribute "graphic rendition" of the current basic object.

When SGR is used to start underlining (singly or doubly), or crossing out, within the scope of subscript or superscript image – see control functions PLD (Partial Line Down) and PLU (Partial Line Up), any lines used to implement such a graphic rendition are lowered or raised in order that the graphic rendition concerned applies to the subscript or superscript characters.

Note 1 – Several parameter values can be used in combination, in order to obtain, for example, underlined italics.

Note 2 – The default parameter value cannot be used in combination with any other parameter value.

Note 3 – When a designated font is invoked, any specification of weight or posture by an SGR parameter value is ignored. This applies to the parameter values 1, 2, 3, 22 and 23. These parameter values are enabled when a primary or alternative font is invoked for which no designation has been made.

Note 4 – The use of parameter values 26 and 50 in document application profiles based on the T.410 Series is deprecated. These values are included in this part of ISO 8613 only for compatibility with some existing applications such as those based upon Recommendation T.61 (1984).

TABLE 4/T.416

Parameter values for SGR

Value	Meaning
0	default rendition (implementation-defined); cancels the effect of any preceding occurrence of SGR and cancels the effect of the presentation attribute "graphic rendition"; invokes the primary font
1	bold or increased intensity
2	faint or decreased intensity
3	italicize
4	underlined
5	slowly blinking
6	rapidly blinking
7	negative image
9	crossed-out (characters still legible but marked as to be deleted)
10	primary (default) font
11	first alternative font
12	second alternative font
13	third alternative font
14	fourth alternative font
15	fifth alternative font
16	sixth alternative font
17	seventh alternative font
18	eighth alternative font
19	ninth alternative font
21	doubly underlined
22	normal intensity (neither bold nor faint)
23	not italicize
24	not underlined (neither singly nor doubly)
25	steady (not blinking)
26	variable spacing
27	positive image
29	not crossed-out
50	not variable spacing

11.1.9 *SHS – Select character spacing*

A control function with a selective parameter which specifies the character spacing to be applied to constant spacing fonts in subsequent text.

The specified character spacing remains until it is changed by a subsequent occurrence of either SHS or the control function SCS (Set Character Spacing) in the current basic object.

The meaning of the parameter value is:

0 120 BMUs
1 100 MBUs
2 80 BMUs
3 200 BMUs
4 400 BMUs

The default value of the parameter is 0.

11.1.10 *SLS – Set line spacing*

A control function with one numeric parameter which specifies the line spacing for subsequent text.

The specified line spacing takes effect immediately and remains in effect until it is changed by a subsequent occurrence of either SLS or the control function SVS (Select Line Spacing) in the current basic component.

The line spacing is expressed as an integral multiple of SMUs.

The default value of the parameter is the equivalent of 200 BMUs.

11.1.11 *SRS – Start reverse string*

A control function with one parameter which is used to indicate either the start or end of a string graphic characters that are to be imaged in the direction opposite to that of the immediately preceding text (see § 5.2.4).

SRS with parameter value 1 indicates the start of the string.

SRS with parameter value 0 indicates the end of the string.

Hard and soft line terminators shall not be used between SRS 1 and SRS 0.

Any occurrence of the control functions PLD (Partial line Down), PLU (Partial Line Up), VPB (Line Position Backward) or VPR (Line Position Relative) within the string of characters delimited by SRS 1 and SRS 0 must be matched by an occurrence of the opposite control function within the string. Strings delimited by SRS may be nested.

11.1.12 *STAB – Selective tabulation*

A control function with a selective parameter which references a tabulation stop position in an associated "line layout table" (see § 7.1.13).

This control function specifies the positioning of the subsequent text, until either the occurrence of another STAB or the end of the current line.

This text is to be positioned at the referenced tabulation stop and aligned in accordance with the properties specified for that tabulation stop.

No default value of the parameter is specified.

11.1.13 *SUB – Substitute character*

A control function which is used in the place of a character that has been found invalid or in error.

11.1.14 *SVS – Select line spacing*

A control function with a selective parameter which specifies the line spacing for subsequent text. The specified line spacing takes effect immediately and remains in effect until it is changed by a subsequent occurrence of either SVS or the control function SLS (Set Line Spacing) in the current basic object.

The meaning of the parameter value is:

0 200 BMUs
1 300 MBUs
2 400 BMUs
3 100 BMUs
4 150 BMUs
9 600 BMUs

The default value of the parameter is 0.

11.1.15 *VPB – Line position backward*

A control function with one numeric parameter which causes the active position to be moved in the opposite direction to the line progression the number of SMUs specified by the parameter.

The combined effect of all occurrences of the control functions VPB and VPR within a given line must be such that the active position is returned to the reference line before the occurrence of a hard or soft line terminator.

The default value of the parameter is the equivalent of 100 BMUs.

Note – The main purposes of VPB are to provide for positioning of parallel annotation and for explicit control for the positioning of superscripts.

11.1.16 *VPR – Line position relative*

A control function with one numeric parameter which causes the active position to be moved in the direction to line progression the number of SMUs specified by the parameter.

The combined effect of all occurrences of the control functions VPB and VPR within a given line must be such that the active position is returned to the reference line before the occurrence of a hard or soft line terminator.

The default value of the parameter is the equivalent of 100 BMUs.

Note – The main purposes of VPR are to provide for positioning of parallel annotation and for explicit control for the positioning of subscripts.

11.1.17 *Code extension control functions*

This is a category of control functions used for the designation and invocation of graphic character sets. They are defined in ISO 6429 and their use is defined in ISO 2022.

11.2 *Layout control functions*

11.2.1 *BS – Backspace*

A control function that causes the active position to be moved, in the direction opposite to the character path, a distance specified by the most recent occurrence either of the control functions SHS (Select Character Spacing) or SCS (Set Character Spacing), if any, or otherwise by the presentation attribute "character spacing".

Note 1 – BS allows for the positioning of item identifiers (see § 5.2.9) on systems which do not implement the control function HPB (Character Position Backward). It is included in this Recommendation only for compatibility with Recommendation T.61 (1984). Its use in other document application profiles based upon the T.410 Series is deprecated. It shall not be used to cause character images to be superimposed.

Note 2 – The control function SSW (Set SPACE Width) has no effect on BS.

11.2.2 *HPB – Character position backward*

A control function with one numeric parameter which causes the active position to be moved in the opposite direction to the character path the number of SMUs specified by the parameter.

The default value of the parameter is the equivalent of 120 BMUs.

Note – The main purposes of HPB are to move the active position backwards from the line home position, and to provide for the positioning of parallel annotation.

11.2.3 *HPR – Character position relative*

A control function with one numeric parameter which causes the active position to be moved in the direction to the character path the number of SMUs specified by the parameter.

The default value of the parameter is the equivalent of 120 BMUs.

Note 1 – Although HPR has a control effect similar to that of one or more space characters, it does not have the graphic equivalence of space characters. Therefore, HPR does not cause spaces to be imaged in accordance with the current graphic rendition, such as underlined, possibly specified by a preceding occurrence of the control function SGR (Select Graphic Rendition).

Note 2 – HPR also provides for the positioning of parallel annotation.

11.2.4 *JFY – No justify*

A control function with a selective parameter which is used at the beginning of a line to indicate that the line must not be justified. It has no effect on subsequent lines.

The only parameter value that is permitted to be used is zero, which is also the default parameter value.

11.2.5 *SACS – Set additional character separation*

A control function with one numeric parameter which specifies increased escapement between graphic characters in subsequent text i.e. a positive value for the inter-character space (see § 5.2.1).

The specified value applies after the first subsequent graphic character and remains in effect until the next occurrence of SACS or a control function SRCS (Set Reduced Character Separation) or until it is reset to 0 by a subsequent occurrence of a hard or soft line terminator.

The parameter value is expressed in SMUs.

The default value of the parameter is 0.

11.2.6 *SRCS – Set reduced character separation*

A control function with one numeric parameter which specifies reduced escapement between graphic characters in subsequent text i.e. a negative value for the inter-character space (see § 5.2.1).

The specified value applies after the first subsequent graphic character and remains in effect until the next occurrence of SRCS or a control function SACS (Set Additional Character Separation) or until it is reset to 0 by a subsequent occurrence of a hard or soft line terminator.

The parameter value is expressed in SMUs.

The default value of the parameter is 0.

11.2.7 *SSW – Set SPACE width*

A control function with one numeric parameter which specifies the characters escapement associated with the character SPACE for subsequent text. The specified value takes effect immediately and remains in effect until it is changed by a subsequent occurrence of SSW or reset to the default value by a subsequent occurrence of a hard or soft line terminator.

The parameter value is expressed in SMUs.

No default parameter is specified. The default width of SPACE is equal to the character spacing if the current font has constant spacing and is otherwise determined by the font concerned.

11.3 *Logical control functions*

11.3.1 *BPH – Break permitted here*

A control function which indicates a point where a line break must occur when text is formatted (see § 12.2.1.3.2).

11.3.2 *NBH – No break here*

A control function which indicates a point where no line break must occur when text is formatted (see § 12.2.1.3.2).

Note – The graphic character NBSP (No Break SPace) should be taken to be equivalent to SPACE followed by NBH.

11.3.3 *PTX – Parallel texts*

A control function which delimits passages of text which are interchanged one after the other, but intended to be presented in parallel with one another (see § 5.2.5).

The only parameter values permitted are:

0
1
3

The default value of the parameter is 0.

PTX with parameter value 1 is the opening delimiter of the first (principal) of two passages of text intended to be presented in parallel with one another.

PTX with parameter value 3 is the closing delimiter of the first passage of text and the opening delimiter of the second (supplementary) passage intended to be presented in parallel with the first.

PTX with parameter value 0 indicates the end of the supplementary passage of text.

Note – Japanese Ruby permits the specification of exactly one supplementary passage of text.

11.4 *Delimiters*

11.4.1 *SOS – Start of string*

A control function that acts as the opening delimiter of a string of graphic characters and/or control functions that is marked to facilitate its removal by a subsequent content layout process. The string is closed by the terminating delimiter control function ST (String Terminator).

A string thus delimited may contain occurrences of graphic characters and control functions, in particular CR (Carriage Return), LF (Line Feed) and HYPHEN, introduced as a result of a formatting process (see § 12.2.1.3).

11.4.2 *ST – String terminator*

A control function that acts as the terminating delimiter of a string opened by the delimiter control function SOS (Start Of String).

11.5 *SP – Space*

A character with properties of both a graphic character and a logical control function.

As a control function, SP is significant to the content layout process. It acts as a word delimiter and indicates a potential line break point except when it is immediately followed by another SP or by an occurrence of the control function NBH (No Break Here) (see § 11.3.2).

As a graphic character, SP causes the active position to be advanced without a graphic symbol to be imaged. However, any graphic renditions that are in effect e.g. underlining, also apply to SP.

Any SP(s) that precede a line terminator, and follow the last graphic character of a line, are ignored by the imaging process.

12 Content layout process

This section describes a content layout process for basic logical objects associated with content architectures of type character.

Its purpose is to aid understanding of the semantics of the presentation attributes and control functions by describing the required results of such a process. However, it is not intended to specify any process that might be carried out in a particular implementation to achieve these results.

12.1 *Introduction*

12.1.1 *Purpose*

The content layout process describes a process of formatting and laying out character content into an allocated area. This area is referred to as the available area and is determined by the document layout process defined in Recommendation T.412.

The purpose of the content layout process is to convert content associated with basic logical components into content associated with basic layout objects. This might imply a transformation of the content from one form to another.

The content layout process results in the creation of a basic layout object(s) into which the content is to be positioned. The dimensions of each basic layout object is returned to the document layout process which determines the precise position of that basic layout object within the available area.

12.1.2 *Available area*

The content layout process is constrained by the available area. The maximum line length is constrained by the dimension of the available area in the direction of the character path.

During the layout of the content associated with a basic logical object into a basic layout object, the following cases can occur:

- The formatted or formatted processable content fits into the available area.
- The formatted or formatted processable content does not fit into the dimensions of the available area in the direction of line progression. In this case, an additional or a new available area is required depending upon any constraints imposed by the document layout process.
- The formatted content does not fit into the dimension of the available area in the direction of the character path. In this case, a large available are is required.

Note – This case is most likely to occur when laying out formatted content associated with a basic logical object.

12.1.3 *Presentation attributes*

The content layout process takes into account the presentation attributes applying to the basic logical object with which the content is associated. It also takes into account any control functions that are embedded in the content.

The presentation attributes applying to the content layout process can be specified in the generic layout structure and presentation styles. The values of these presentation attributes are determined according to the defaulting rules specified in Recommendation T.412.

12.1.4 *Character content architecture classes*

The content layout process is described for basic logical objects associated with content that conforms to any of the three character content architecture classes (see § 4.1) as follows:

- processable form character content in which the content layout process provides for formatting of the content. The content layout process results in the output of content in formatted or formatted processable form depending upon the desired form of document;
- formatted processable form character content in which the content layout process provides for reformatting of the content. This involves an initialization process which must be carried out on the content before the content layout process can be applied to that content. The content layout process results in the output of content in formatted or formatted processable form depending upon the desired form of document;
- formatted form character content in which the content layout process has no effect on the content itself but still determines the dimensions of the basic layout object into which that content is to be positioned.

12.1.5 *Use of delimiters*

When formatted processable form content is created as a result of the content layout process, all shared control functions and graphic characters inserted into the content as a result of the content layout process are enclosed between the delimiter control functions SOS (Start Of String) and ST (String Terminator).

12.1.6 *Layout of the content*

For each of the three character content architecture classes, three cases of laying out the content of basic logical objects into basic layout objects are possible:

- single basic logical object to single basic layout object: the content of a single basic logical object can be laid out into a single basic layout object and is the only content associated with this basic layout object;
- single basic logical object to multiple basic layout object: the content of a single basic logical object is split among two or more basic layout objects, i.e. the content portions associated with two or more basic layout objects are derived from a single basic logical object;
- multiple basic logical object to single layout object: the content of two or more basic logical objects is laid out into a single basic layout object, i.e. the content portions of two or more basic logical objects are associated with a single basic layout object.

Multiple basic logical object to multiple basic layout object is also possible, but not described explicitly since this is a combination of the last two cases above.

12.1.7 *Layout sequence*

In all cases, the same sequence of steps for laying out content associated with a basic logical object is executed as follows:

- initialization;
- determination of initial point;
- formatting of the content;
- identification of content portions;
- determination of basic layout object dimensions;
- determination of the value of the presentation attribute "initial offset".

This also results in the creation of a basic layout object.

Although the sequence of steps is the same in all cases, the action performed at individual steps may vary.

12.2 *Content layout process for processable content*

12.2.1 *Single basic logical object to single basic layout object*

12.2.1.1 *Initialization*

In the case of processable form content, no initialization of the content is necessary.

12.2.1.2 *Determination of initial point*

The location of the initial point depends upon:

- the presentation attributes "character path" and "line progression" (determining the start edge and top edge of the basic layout object);
- the presentation attribute "kerning offset" (specifying the location of the start edge of the positioning area relative to the start edge of the basic layout object);
- the presentation attribute "indentation" (specifying the distance between the initial point and the start edge of the positioning area);
- the invocation of a font by the presentation attribute "graphic rendition" and the presentation attribute "character orientation" (specifying the minimum backward extent of the first line box);
- the presence of control functions PLU (Partial Line Up), PTX (Parallel Texts), VPB (Line Position Backward) and font invocation by SGR (Select Graphic Rendition) in the first line of characters to be imaged (modifying the backward extent of the first line box).

The position of the initial point relative to the start edge and top edge of the positioning area is determined such that:

- its distance from the top edge of the positioning area is equal to the backward extent of the first line box;
- its distance from the start edge of the positioning area is equal to the value specified by the presentation attribute "indentation".

The position of the initial point relative to the upper left corner of the basic layout object can be determined only after the dimension of the basic layout object has been determined (see § 12.2.1.5). This value is assigned to the presentation attribute "initial offset" and should always be specified explicitly in order to achieve the desired result by the content imaging process.

12.2.1.3 *Formatting of the content*

Formatting of the content involves:

- the positioning of character images within a line box (see § 5.2);
- the determination of line breaks;
- the positioning of line boxes within the basic layout (see § 5.3).

It may involve the insertion of control functions and the assignment of presentation attribute values to the basic layout object.

As a general rule, the available area is utilized as much as possible in the direction of the character path.

12.2.1.3.1 *Position of character images within a line box*

There are two sets of operations that have an effect on the positioning of character images within a line box. One of these sets is related to the presentation attribute "formatting indicator", the other is not.

The operations related to the attribute "formatting indicator" are:

- alignment (presentation attribute "alignment");
- tabulation (presentation attribute "line layout table" and the control function STAB);
- first line offset (presentation attribute "first line offset");
- itemization (presentation attribute "itemization");
- pairwise kerning (presentation attribute "pairwise kerning").

Alignment and tabulation are mutually exclusive but itemization and first line offset may be applied in combination with either of them.

These operations may be performed by either the content layout process or the content imaging process. However, they can be performed by the content layout process only if the presentation attribute "formatting indicator" and the control functions HPB (Character Position Backward), HPR (Character Position Relative), SACS (Set Additional Character Separation), SRCS (Set Reduced Character Separation) and SSW (Set SPACE Width) are available in the content architecture level concerned.

The result of performing these operations by the content layout process is the insertion of the above control functions in the content.

If the content layout process has performed all of the specified operations for a basic layout object and inserted all necessary control functions, the value of the presentation attribute "reformatting indicator" is set to 'yes', otherwise it is set to 'no'.

Whether or not the content layout process inserts these control functions, it always determines the allocation of characters to each line box and the dimensions of each line box.

Note – If the value of the presentation attribute "formatting indicator" is 'no' or if a font substitution has been made, then the content imaging process should perform these operations.

The other set of operations which are not related to the presentation attribute "formatting indicator" are:

- character ordering (control function SRS);
- parallel annotation (control function PTX);
- graphic character composition (control function GCC).

12.2.1.3.1.1 *Pairwise kerning*

If the presentation attribute "pairwise kerning" specifies 'yes' and the content layout process is capable of performing this function and the font used provides the necessary information, then certain combinations of character images are positioned closer to (or further apart from) each other than determined by their position and escapement points.

When pairwise kerning is performed by the content layout process, it will result in the insertion of control functions HPB (Character Position Backward) or HPR (Character Position Relative) between the two characters involved.

12.2.1.3.1.2 *First line offset*

The characters associated with the first line can be controlled to be laid out differently from the rest of the lines in this object.

The presentation attribute "first line offset" specifies if the first line has an overhang or indentation relative to the line home position.

When first line offset is performed by the content layout process, it will result in the insertion of a control function HPB (Character Position Backward) or HPR (Character Position Relative).

12.2.1.3.1.3 *Itemization*

The first line of a basic layout object may contain an item identifier. The position of the item identifier is controlled by the presentation attribute "itemization".

When itemization is performed by the content layout process, it will result in the insertion of a control function HPB (Character Position Backward) or HPR (Character Position Relative) before the text of the item identifier.

12.2.1.3.1.4 *Alignment*

None of the alignments except 'start-aligned' can be performed until the dimensions of the basic layout object have been determined (see § 12.2.1.4).

When alignment is performed by the content layout process, the line length for alignment is determined to be:

- for the first line, the distance between the line home position and the end edge of the positioning area minus the value of the presentation attribute "first line offset";
- for all other lines, the distance between the line home position and the end edge of the positioning area.

The various values of the presentation attribute "alignment" are treated as follows:

- 'start-aligned' does not result in the insertion of any control functions;
- 'end-aligned' and 'centred' result in the insertion of a control function HPR (Character Position Relative) either before the first graphic character of each line or after the CR (Carriage Return) delimiting the item identifier if the presentation attribute "itemization" specifies a value other than 'no itemization';
- 'justified' results in the insertion of zero, one or more control functions SSW (Set SPACE Width), SACS (Set Additional Character Separation) and/or SRCS (Set Reduced Character Separation) in each line which ends with a line terminator inserted by the content layout process. The precise usage of SACS SRCS and SSW is implementation dependent.

Note – The presentation attribute "Alignment" does not apply to the item identifier.

When the presentation attribute "alignment" has the value 'justified', irrespective of whether the alignment is performed by the content layout process or the content imaging process, the control function JFY (No Justify) is inserted at the beginning of the last line of a character sequence in order to avoid justification of this line by the content imaging process.

12.2.1.3.1.5 *Tabulation*

When tabulation is performed by the content layout process, it results in the insertion of a control function HPR (Character Position Relative) or HPB (Character Position Backward) between each occurrence of the control function STAB (Selective Tabulation) and the first graphic character following it.

12.2.1.3.1.6 *Parallel annotation*

The occurrence of the control function PTX (Parallel Texts) in the content specifies that a string of characters is to be laid out as a parallel annotation to another specified string of characters. The result of the content layout process is as described in § 5.2.5.

If the output of the content layout process is in formatted form, the positioning of the parallel annotation is achieved by the removal of all occurrences of PTX and the insertion of the appropriate control functions HPR (Character Position Relative), HPB (Character Position Backward), VPR (Line Position Relative) and VPB (Line Position Backward).

If the output of the content layout process is in formatted processable form, the positioning of the parallel annotation is achieved by inserting the control functions HPR (Character Position Relative), HPB (Character Position Backward), VPR (Line Position Relative) and VPB (Line Position Backward) and enclosing them by the delimiter control functions SOS (Start Of String) and ST (String Terminator).

12.2.1.3.1.7 *Character ordering*

The occurrence of the control function SRS (Start Reverse String) in the content of a basic logical object controls the direction of imaging of the interchanged characters. The result of the content layout process is as described in § 5.2.4.

12.2.1.3.1.8 *Graphic character composition*

The control function GCC (Graphic Character Composition) is used to combine two or more graphic characters into a single symbol. The width of these graphic characters may be less than the sum of the widths of the images of the component characters.

12.2.1.3.2 *Insertion of line breaks*

The formatting process may cause the insertion of additional line breaks into the content. Existing hard line terminators (CR/LF combinations) that are already in the content remain in the content but must be taken into account during the formatting process.

If the output is in formatted processable form, the inserted line breaks consist of soft line terminators represented by the control function sequence SOS CR LF ST. Optionally, characters inserted by an implementation dependent hyphenation algorithm are included in the SOS-ST string. No characters are deleted from the content.

If the output is in formatted form, the inserted line breaks consist of hard line terminators represented by the control function sequence CR LF. All occurrences of the control functions BPH (Break Permitted Here) and NBH (No Break Here) are deleted.

It is the intention of the formatting process that the number of characters between the inserted line breaks is the maximum possible for each line. the exact algorithm for inserting line breaks is implementation dependent and is not defined in the T.410 Series. However, the line break algorithm shall conform to the following constraints:

- a soft line break may by inserted:
  - after a SP which is not immediately followed by another SP or the control function NBH (No Break Here);
  - after the control function BPH (Break Permitted Here);
  - at a point determined by an implementation or language dependent algorithm;
- a line break is not permitted:
  - when a subscribed rendition is active;
  - within a string with reversed presentation direction;
  - within a string of parallel annotation.

12.2.1.3.3 *Positioning of line boxes*

The first line box is positioned with its line home position at the initial point as described in § 12.2.1.2.

Each line box is positioned with its line home position on the line from the initial point in the direction of line progression.

When proportional line spacing is not to be performed, the distance between the line home positions of two successive line boxes is equal to the current line spacing. The initial value of the current line spacing is the value of the presentation attribute "line spacing". This value may be altered by occurrences of the control function SVS (Select Line Spacing) and SLS (Set Line Spacing).

When proportional line spacing is to be performed by the content layout process, the distance between the line home positions of two successive line boxes is evaluated by an implementation dependent algorithm. If the evaluated distance differs from the current value of line spacing, the control function SLS (Set Line Spacing) is inserted before the line terminator of the first line. The evaluated distance is inserted as the parameter of this control function and also becomes the current line spacing.

If the output of the content layout process is in formatted processable form, those occurrences of the control function SLS (Set Line Spacing) inserted by the content layout process are enclosed by the delimiters SOS (Start Of String) and ST (String Terminator).

12.2.1.4 *Identification of content portions*

The content layout process shall also provide a value for the attribute "Content portion identifier – layout" for each content portion associated with the layout structure.

12.2.1.5 *Determination of basic layout object dimensions*

The formatting action continues until all the available content has been allocated or all the available area has been filled.

The content layout process attempts to allocate the minimum portion of the available area sufficient to hold all of the available content. Hence, the dimensions of the basic layout object can only be determined once formatting is complete.

The mapping to horizontal and vertical dimensions of the basic layout object is dependent upon the character path as follows:

Character path	Dimension in direction of character path	Dimension in direction orthogonal to character path
0, 180	Horizontal dimension	Vertical dimension
90, 270	Vertical dimension	Horizontal dimension

12.2.2 *Single basic logical object to multiple basic layout objects*

If the formatted content does not fit into the available area in the direction of line progression then an additional available area has to be obtained from the document layout process e.g. in the case of a page boundary. In this case, the content of a single basic logical object is allocated to more than one basic layout object. The original content portion is split into several content portions, each corresponding to a different basic layout object.

There are two changes with respect to the description in § 12.2.1:

- the presentation attributes of the second and subsequent basic layout object are given values corresponding to the status of rendition (line spacing, character spacing, graphic renditions etc.) at the end of the previous basic layout object;
- the allocation of content to basic layout objects is to be performed such that the presentation attributes "orphan size" and "widow size" are fulfilled.

12.2.3 *Multiple basic logical objects to single basic layout object*

When concatenation results in the content associated with a more than one basic logical object being laid out in a single basic layout object (see § 7.5), it may be necessary for the content layout process to insert control functions at the beginning of the second and subsequent basic logical objects so that the values of certain presentation attributes associated with those basic logical objects are applied. These control functions are:

- SHS (Select Character Spacing) or SCS (Set character Spacing) for "character spacing";
- Designation and/or invocation sequences for "graphic character sets";
- IGS (Identify Graphic Subrepertoire) for "graphic character subrepertoire";
- SGR (Select Graphic Rendition) for "graphic rendition";
- SVS (Select Line Spacing) or SLS (Set Line Spacing) for "line spacing".

If the output of the content layout process is in formatted processable form, then the control functions inserted by the content layout process are enclosed by the delimiters SOS (Start Of String) and ST (String Terminator).

The presentation attribute "proportional line spacing" specified for the second or subsequent basic logical objects is interpreted by the content layout process as described in § 12.2.1.

The other presentation attributes specified for the second and subsequent basic logical objects are ignored (see § 7.5).

12.3 *Content layout process for formatted processable content*

For formatted processable form content, the initialization step of the content layout process shall:

- remove all SOS-ST control strings from the content;
- remove all layout control functions (BS, HPB, HPR, JFY, SACS, SRCS and SSW) from the content (see § 11.2);
- combine all content portions associated with the same basic logical object into a single content portion in order to prevent unnecessary fragmentation of the document content which could otherwise occur;
- delete the content portion attribute "content layout identifier - layout", if present.

After initialization, the content is in processable form. The remaining steps of the content layout process are as described for processable content (see § 12.2).

12.4 *Content layout process for formatted content*

For formatted content, the content layout process still has to determine the dimensions of the basic layout object to be allocated.

The same steps of the content layout process are used as for processable form content. In this case, however, formatting only involves:

- the positioning of character images within a line box as described in § 5.2 and 12.2.1.3.1;
- the positioning of line boxes within a basic layout object as described in § 5.3.

13 Content imaging process

This section describes a content imaging process for basic layout objects associated with content architecture of type character.

Its purpose is to aid understanding of the semantics of the presentation attributes and control functions by describing the required results of such a process. However, it is not intended to specify any process that might be carried out in a particular implementation to achieve these results.

13.1 *Introduction*

The content imaging process is only concerned with the logical structures, the presentation styles and the content of basic layout components conforming to this Recommendation.

All logical control functions, if any, are ignored.

The content imaging process is only applicable to the formatted and formatted processable form character content architecture classes.

13.2 *Content imaging process for formatted content*

This section describes how the various shared and layout presentation attributes and shared and layout control functions influence the image of the contents.

Most shared presentation attributes and shared control functions serve the purpose of positioning and orienting character images along reference lines and for positioning and orienting these reference lines within the basic layout object.

Thus, the effect of most shared presentation attributes and shared control functions have already been described in the content layout process.

Most layout presentation attributes and control functions are related to positioning and, thus, have already been described as the result of the content layout process.

The following sub-sections provide additional information relating to the content imaging process.

13.2.1 *Determination of initial point*

The active position for imaging is set on the initial point within the basic layout object. This information is derived from the presentation attribute "initial offset".

13.2.2 *Choosing character images*

The following presentation attributes and control functions determine the character images to be chosen for imaging:

- "graphic character sets" and code extension announcer, designation and invocation control functions;
- "character fonts" (together with the attribute "fonts list" in the document profile);
- "graphic rendition" and SGR (Select Graphic Rendition).

If the specified font is not available, the content imaging process may decide to provide a substitute for this font by making use of the font information available in the document profile attribute "fonts list".

13.2.3 *Formatting indicator*

The presentation attribute "formatting indicator" specifies whether first line offset, itemization, alignment, tabulation and pairwise kerning have already been performed by the content layout process or not.

If not, or if the result from the content layout process has been invalidated by a font substitution, then the content imaging process must perform the task in the same way as described in the content layout process (see § 12.2.1.3.1).

13.3 *Content imaging process for formatted processable content*

For content in formatted processable form, the only difference from the case of formatted form is that all logical control functions and the delimiter control functions SOS (Start Of String) and ST (String Terminator) are ignored.

The effect of shared and layout presentation attributes and shared and layout control functions is as described in § 13.2.

14 Interactions between presentation attributes and control functions

This section contains a summary of the interactions among and between presentation attributes and control functions defined in various places in this Recommendation as follows:

- LF is restricted to be used in the following cases:
  1) at the beginning of the content of a basic layout component;
  2) immediately following a control function CR (Carriage Return);
  3) immediately following another LF.
- BPH or CR is not permitted in the following cases:
  1) when PLU or PLD is active;
  2) after VPR and/or VPB have moved the active position away from the reference line;
  3) between the control functions SRS 1 and SRS 0;
  4) between the control functions PTX 1 and PTX 0.
- Rendition aspects defined by some presentation attributes can be overridden by control functions embedded in content portions as follows:

Presentation attribute	Control function
Character spacing	SHS, SCS
Line spacing	SVS, SLS
Graphic rendition	SGR
Graphic character subrepertoire	IGS
Graphic character sets	Code extension control functions

- When the presentation attribute "line layout table" specifies any tabulation stops, the presentation attribute "alignment" is assumed to have the value "start-aligned".

15 Definition of character content architecture classes

This section defines the three classes of character content architecture as described in § 5, namely:

- a formatted form character content architecture which allows for document content to be presented (e.g. printed or displayed) as intended by the originator. Formatted form can be used in any basic component;
- a processable form character content architecture which allows for document content to be processed (e.g. edited or formatted). Processable form can be used in any basic logical component;
- a formatted processable form character content architecture which allows for document content to be processed and also to be presented as intended by the originator. Formatted processable form can be used in any basic component.

Paragraphs 15.1, 15.2 and 15.3 specify the categories of presentation attributes and control functions that pertain to these content architecture classes. The individual presentation attributes and control functions are summarized in Tables 5 and 6/T.416. The permissible values and the default values of the presentation attributes and the control functions parameter values are defined in § 7 and 11 respectively.

TABLE 5/T.416

Summary of presentation attributes

Character content architecture class	Formatted processable		
		Processable	
Presentation attribute	Formatted		
Alignment	X	X	X
Character fonts	X	X	X
Character orientation	X	X	X
Character path	X	X	X
Character spacing	X	X	X
Code extension announcers	X	X	X
First line offset	X	X	X
Formatting indicator	X		X
Graphic character sets	X	X	X
Graphic character subrepertoire	X	X	X
Graphic rendition	X	X	X
Indentation		X	X
Initial offset	X		X
Itemization	X	X	X
Kerning offset	X	X	X
Line layout table	X	X	X
Line progression	X	X	X
Line spacing	X	X	X
Orphan size		X	X
Pairwise kerning	X	X	X
Proportional line spacing		X	X
Widow size		X	X

TABLE 6/T.416

Summary of control functions

Character content architecture class	Formatted processable		
		Processable	
Control function	Formatted		
BPH (Break Permitted Here)		X	X
BS (Backspace)	X		X
CR (Carriage Return)	X	X	X
GCC (Graphic Character Composition	X	X	X
HPB (Character Position Relative)	X		X
HPR (Character Position Backward)	X		X
IGS (Identify Graphic Subrepertoire	X	X	X
JFY (No Justify)	X		X
LF (Line Feed)	X	X	X
NBH (No Break Here)		X	X
PLD (Partial Line Down)	X	X	X
PLU (Partial Line Up)	X	X	X
PTX (Parallel Texts)		X	X
SACS (Set Additional Character Spacing)	X		X
SCS (Set Character Spacing)	X	X	X
SGR (Select Graphic Rendition)	X	X	X
SHS (Select Character Spacing)	X	X	X
SLS (Set Line Spacing)	X	X	X
SOS (Start Of String)			X
SP (Space)	X	X	X
SRCS (Set Reduced Character Spacing)	X		X
SRS (Start Reverse String)	X	X	X
SSW (Set SPACE Width)	X		X
ST (String Terminator)			X
STAB (Selective Tabulation)	X	X	X
SUB (Substitute)	X	X	X
SVS (Select Line Spacing)	X	X	X
VPB (Line Position Backward)	X	X	X
VPR (Line Position Relative)	X	X	X
Code extension control functions	X	X	X

In order to aid the definition of content architecture levels for use in document application profiles (see Recommendation T.411), the presentation attributes and the control functions that are applicable to each content architecture class are listed in Annex A, together with their permissible values and default values.

15.1 *Formatted character content architecture class*

The following categories of presentation attributes and control functions pertain to the formatted character content architecture class:

- shared presentation attributes (see § 7.1);
- layout presentation attributes (see § 7.2);
- shared control functions (see § 11.1);
- layout control functions (see § 11.2).

15.2 *Processable character content architecture class*

The following categories of presentation attributes and control functions pertain to the processable character content architecture class:

- shared presentation attributes (see § 7.1);
- logical presentation attributes (see § 7.3);
- shared control functions (see § 11.1);
- logical control functions (see § 11.3).

15.3 *Formatted processable character content architecture class*

The following categories of presentation attributes and control functions pertain to the formatted processable character content architecture class:

- shared presentation attributes (see § 7.1);
- layout presentation attributes (see § 7.2);
- logical presentation attributes (see § 7.3);
- shared control functions (see § 11.1);
- layout control functions (see § 11.2);
- logical control functions (see § 11.3);
- delimiters (see § 11.4).

ANNEX A

(to Recommendation T.416)

Summary of content architecture classes

(Informative)

This Annex summarizes the present attributes and control functions that apply to each of the three content architecture classes (formatted, processable and formatted processable) defined in section 14, together with their permissible values and default values.

The purpose of this Annex is to facilitate the definition of content architecture levels for use in document application profiles (see Recommendation T.411).

A.1 *Formatted character content architecture class*

A.1.1 *Presentation attributes*

Attribute	Permissible values	Default value
alignment	start aligned end aligned centred justified	start aligned
character fonts	1) any positive integer 2) any positive integer	none none
character orientation	0, 90, 180, 270 degrees	0 degrees
character path	0, 90, 180, 270 degrees	0 degrees
character spacing	any positive integer	equivalent of 120 BMUs
code extension announcers	any string of escape sequences in accordance with ISO 2022	escape sequences for G0 and G2 sets
first line offset	any integer	0
formatting indicator	no, yes	no
graphic character sets	the escape sequences to designate, and any required locking shift functions to invoke, one or more registered graphic character sets	the escape sequences to designate, and the locking shift functions to invoke, the graphic character sets of ISO 6937-2
graphic character subrepertoire	0 or the identifier of any registered subrepertoire of ISO 6937	0
graphic rendition	0, 1-7, 9, 10-19, 21-27, 29, 50	0
initial offset	1) any non-negative integer 2) any non-negative integer	see Table 2/T.416 see Table 2/T.416
itemization	1) no itemization start-aligned end-aligned 2) any integer 3) any integer	no itemization the distance from the start edge of the positioning area to the line home position 0

Attribute	Permissible values	Default value
kerning offset	1) any non-negative integer 2) any non-negative integer	0 0
line layout table	1) any 2) any 3) start-aligned end-aligned centred aligned-around 4) any	No tabulation stops defined
line progression	90, 270 degrees	270 degrees
line spacing	any positive integer	equivalent of 200 BMUs

A.1.2 *Control functions*

Control function	Permissible value(s)	Default value(s)
BS	not applicable	not applicable
CR	not applicable	not applicable
GCC	0, 1, 2	0
HPB	any positive integer	equivalent of 120 BMUs
HPR	any positive integer	equivalent of 120 BMUs
IGS	0 or the identifier of any registered subrepertoire of ISO 6937	0
JFY	0	0
LF	not applicable	not applicable
PLD	not applicable	not applicable
PLU	not applicable	not applicable
SACS	any positive integer	0
SCS	any positive integer	equivalent of 120 MBUs
SGR	0, 1-7, 9, 10-19, 21-27, 29, 50	0
SHS	0, 1, 2, 3	0

Control function	Permissible value(s)	Default value(s)
SLS	any positive integer	equivalent of 200 MBUs
SP	not applicable	not applicable
SRCS	any positive integer	0
SRS	0, 1	0
SSW	any positive integer	none
STAB	any	none
SUB	not applicable	not applicable
SVS	0, 1, 2, 3, 4, 9	0
VPB	any positive integer	equivalent of 100 BMUs
VPR	any positive integer	equivalent of 100 BMUs

In addition, any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

A.2 *Processable character content architecture class*

A.2.1 *Presentation attributes*

Attribute	Permissible values	Default value
alignment	start aligned end aligned centred justified	start aligned
character fonts	1) any positive integer 2) any positive integer	none none
character orientation	0, 90, 180, 270 degrees	0 degrees
character path	0, 90, 180, 270 degrees	0 degrees
character spacing	any positive integer	equivalent of 120 BMUs
code extension announcers	any string of escape sequences in accordance with ISO 2022	escape sequences for G0 and G2 sets
first line offset	any integer	0

Attribute	Permissible values	Default value
graphic character sets	the escape sequences to designate, and any required locking shift functions to invoke, one or more registered graphic character sets	the escape sequences to designate, and the locking shift functions to invoke, the graphic character sets of ISO 6937-2
graphic character subrepertoire	0 or the identifier of any registered subrepertoire of ISO 6937	0
graphic rendition	0, 1-7, 9, 10-19, 21-27, 29, 50	0
indentation	any non-negative integer	0
itemization	1) no itemization start-aligned end-aligned 2) any integer 3) any integer	no itemization the distance from the start edge of the positioning area to the line home position 0
kerning offset	1) any non-negative integer 2) any non-negative integer	0 0
line layout table	1) any 2) any 3) start-aligned end-aligned centred aligned-around 4) any	none none start-aligned none
line progression	90, 270 degrees	270 degrees
line spacing	any positive integer	equivalent of 200 BMUs
orphan size	any positive integer	1
pairwise kerning	yes, no	no
proportional line spacing	yes, no	no
widow size	any positive integer	1

A.2.2 *Control functions*

Control function	Permissible value(s)	Default value(s)
BPH	not applicable	not applicable
CR	not applicable	not applicable
GCC	0, 1, 2	0
IGS	0, or the identifier of any registered subrepertoire of ISO 6937	0
LF	not applicable	not applicable
NBH	not applicable	not applicable
SCS	not positive integer	equivalent of 120 BMUs
SGR	0, 1-7, 9, 10-19, 21-27, 29, 50	0
SHS	0, 1, 2, 3	0
SLS	any positive integer	equivalent of 200 BMUs
SP	not applicable	not applicable
SRS	0, 1	0
STAB	any	none
SUB	not applicable	not applicable
SVS	0, 1, 2, 3, 4, 9	0
VPB	any positive integer	equivalent of 100 BMUs
VPR	any positive integer	equivalent of 100 BMUs

In addition, any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

A.3 *Formatted processable character content architecture class*

A.3.1 *Presentation attributes*

Attribute	Permissible values	Default value
alignment	start aligned end aligned centred justified	start aligned
character fonts	1) any positive integer 2) any positive integer	none none

Attribute	Permissible values	Default value
character orientation	0, 90, 180, 270 degrees	0 degrees
character path	0, 90, 180, 270 degrees	0 degrees
character spacing	any positive integer	equivalent of 120 BMUs
code extension announcers	any string of escape sequences in accordance with ISO 2022	escape sequences for G0 and G2 sets
first line offset	any integer	0
formatting indicator	no, yes	no
graphic character sets	the escape sequences to designate, and any required locking shift functions to invoke, one or more registered graphic characters	the escape sequences to designate, and the locking shift functions to invoke, the graphic character sets of ISO 6937-2
graphic character subrepertoire	0 or the identifier of any registered subrepertoire of ISO 6937	0
graphic rendition	0, 1-7, 9, 10-19, 21-27, 29, 50	0
initial offset	1) any non-negative integer 2) any non-negative integer	see Table 2/T.416 see Table 2/T.416
indentation	any non-negative integer	0
itemization	1) no itemization start-aligned end-aligned 2) any integer 3) any integer	no itemization the distance from the start edge of the positioning area to the line home position 0
kerning offset	1) any non-negative integer 2) any non-negative integer	0 0

Attribute	Permissible values	Default value
line layout table	1) any 2) any 3) start-aligned end-aligned centred aligned-around 4) any	none none start-aligned none
line progression	90, 270 degrees	270 degrees
line spacing	any positive integer	equivalent of 200 BMUs
orphan size	any positive integer	1
pairwise kerning	yes, no	no
proportional line spacing	yes, no	no
widow size	any positive integer	1

A.3.2 *Control functions*

Control function	Permissible value(s)	Default value(s)
BPH	not applicable	not applicable
BS	not applicable	not applicable
CR	not applicable	not applicable
GCC	0, 1, 2	0
HPB	any positive integer	equivalent of 120 BMUs
HPR	any positive integer	equivalent of 120 BMUs
IGS	0 or the identifier of any registered sub-repertoire of ISO 6937	0
JFY	0	0
LF	not applicable	not applicable
NBH	not applicable	not applicable
PLD	not applicable	not applicable

Control function	Permissible value(s)	Default value(s)
PLU	not applicable	not applicable
PTX	0, 1, 3	0
SACS	any positive integer	0
SCS	any positive integer	equivalent of 120 MBUs
SGR	0, 1-7, 9, 10-19, 21-27, 29, 50	0
SHS	0, 1, 2, 3	0
SLS	any positive integer	equivalent of 200 BMUs
SOS	not applicable	not applicable
SP	not applicable	not applicable
SRCS	any positive integer	0
SRS	0, 1	0
SSW	any positive integer	none
ST	not applicable	not applicable
STAB	any	none
SUB	not applicable	not applicable
SVS	0, 1, 2, 3, 4, 9	0
VPB	any positive integer	equivalent of 100 BMUs
VPR	any positive integer	equivalent of 100 BMUs

In addition, any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

ANNEXE B

(to Recommendation T.416)

Character content architecture levels

(Informative)

The content of this Annex is for information only and may be included in a future register of character content architecture levels and will then be deleted from this Recommendation.

This Annex contains the definitions of nine character content architecture levels for use in document application profiles. These have been defined in accordance with the rules contained in Recommendation T.411.

The content architecture levels defined in this section are listed below. They are grouped into four formatted content architecture levels (CF), three processable content architecture levels (CP) and two formatted processable content architecture levels (CFP):

- CF-0: This content architecture is functionally equivalent to Telex (CCITT ITA2);

- CF-1: This content architecture is functionally equivalent to conventional implementations of Recommendation T.50;
- CF-2: This content architecture is functionally equivalent to Teletex (Recommendation T.61);
- CF-3: This content architecture is an enhanced formatted form architecture which does not correspond to any existing standard and which incorporates all the features defined for its class;
- CP-0: This content architecture is functional equivalent to Recommendation X.420 (1984) - Simple formattable documents;
- CP-2: This content architecture is a processable form architecture that functionally corresponds to the formatted content architecture CF-2;
- CP-3: This content architecture is a processable form content architecture which does not correspond to any existing standard and which incorporates all the features defined for its class;
- CFP-2: This content architecture is the formatted processable form architecture which corresponds to the formatted form content architecture CF-2 and the processable form content architecture CP-2;
- CFP-3: This content architecture is a formatted processable form content architecture which does not correspond to any existing standard and which incorporates all the features defined for its class.

CF-0 is a subset of CF-1, which is a subset of CF-2, which in turn is a subset of CF-3.

CP-0 is a subset of CP-2, which in turn is a subset of CP-3.

CF-2 and CP-2 are subsets of CFP-2, which is a subset of CFP-3.

CF-3 and CP-3 are subsets of CFP-3.

B.1 *Character content architecture level CF-0*

B.1.1 *Type*

CF-0 is a character content architecture level pertaining to the formatted character content architecture class.

B.1.2 *Presentation attributes*

None are permitted to be specified.

It is assumed that all presentation attributes that are applicable to formatted character content architectures have values equal to the default values specified in this Recommendation except:

- "graphic character set": default value is the primary character set of ISO 6937-2;
- "graphic character subrepertoire": default value is the minimum subrepertoire of ISO 6937-2.

B.1.3 *Control functions*

Control function	Basic value(s)	Non-basic value(s)
CR	not applicable	not applicable
LF	not applicable	not applicable
SP	not applicable	not applicable

B.2 *Character content architecture level CF-1*

B.2.1 *Type*

CF-1 is a character content architecture level pertaining to the formatted character content architecture class.

B.2.2 *Presentation attributes*

Presentation attribute	Basic value(s)	Non-basic value(s)
code extension announcers	any string of escape sequences in accordance with ISO 2022	none
graphic character sets	the escape sequences to designate, and the locking of shift functions to invoke, the primary graphic character set of ISO 6937-2	the escape sequences to designate, and any required locking shift functions to invoke, any other registered graphic character sets
graphic character subrepertoire	0	the identifier of any registered subrepertoire of ISO 6937

The default value of these presentation attributes is as specified in Recommendation T.416.

It is assumed that all presentation attributes that are applicable to formatted character content architectures, and that are not specified in the above, have values equal to the default values specified in this Recommendation.

B.2.3 *Control functions*

Control function	Basic value(s)	Non-basic value(s)
CR	not applicable	not applicable
LF	not applicable	not applicable
SP	not applicable	not applicable

Any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

B.3 *Character content architecture level CF-2*

B.3.1 *Type*

CF-2 is a character content architecture level pertaining to the formatted character content architecture class.

B.3.3 *Presentation attributes*

Presentation attribute	Basic value(s)	Non-basic value(s)
alignment	start aligned	none
character orientation	0 degrees	90 degrees
character path	0, 90 degrees	270 degrees
character spacing	the equivalent of 120 BMUs	the equivalent of 80, 100, 120 BMUs
code extension announcers	any string of escape sequences in accordance with ISO 2022	none
graphic character sets	the escape sequences to designate, and the locking shift functions to invoke, the graphic character sets of ISO 6937-2	the escape sequences to designate, and any required locking shift functions to invoke, any other registered graphic character sets
graphic character subrepertoire	3	the identifier of any registered subrepertoire of ISO 6937
graphic rendition	0, 4	1, 3, 10-19, 22-24, 26, 50
initial offset	1) any non-negative integer 2) any non-negative integer	none none
line progression	270 degrees	90 degrees
line spacing	the equivalent of 100, 200, 300, 400 MBUs	the equivalent of 150 BMUs

The default value of these presentation attributes is as specified in this Recommendation except "graphic character subrepertoire".

It is assumed that all presentation attributes that are applicable to formatted character content architectures, and that are not specified in the above table, have values equal to the default values specified in this Recommendation.

B.3.3 *Control functions*

Control function	Basic value(s)	Non-basic value(s)
BS	not applicable	not applicable
CR	not applicable	not applicable
IGS	3	the identifier of any other registered subrepertoire of ISO 6937
LF	not applicable	not applicable
PLD	not applicable	not applicable
PLU	not applicable	not applicable
SGR	0, 4	1, 3, 10-19, 22-24, 26, 50
SHS	0	1, 2, 3
SP	not applicable	not applicable
SUB	not applicable	not applicable
SVS	0, 1, 2, 3	4

Any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

The default value of these control function parameters is as specified in this Recommendation except IGS (default value = 3).

B.4 *Character content architecture level CF-3*

B.4.1 *Type*

CF-3 is a character content architecture level pertaining to the formatted character content architecture class.

B.4.2 *Presentation attributes*

Presentation attribute	Basic value(s)	Non-basic value(s)
alignment	start aligned end aligned centred justified	none
character fonts	1) none 2) none	any any
character orientation	0 degrees	90, 180, 270 degrees
character path	0, 90 degrees	180, 270 degrees
character spacing	the equivalent of 100, 120 BMUs	any other positive integer

Presentation attribute	Basic value(s)	Non-basic value(s)
code extension announcers	any string of escape sequences in accordance with ISO 2022	none
first line offset	any integer	none
formatting indicator	no, yes	none
graphic character sets	the escape sequences to designate, and the locking shift functions to invoke, the graphic character sets of ISO 6937-2	the escape sequences to designate, and any required locking shift functions to invoke, any other registered graphic character sets
graphic character subrepertoire	0	the identifier of any registered subrepertoire of ISO 6937
graphic rendition	0, 1, 3-4, 9, 10-19, 21-24, 29	2, 5-7, 25-27, 50
initial offset	1) any non-negative integer 2) any non-negative integer	none none
itemization	1) no itemization start-aligned end-aligned 2) any integer 3) any integer	none none none
kerning offset	1) any non-negative integer 2) any non-negative integer	none none
line layout table	1) any 2) any 3) start-aligned end-aligned centred aligned-around 4) any	none none none none
line progression	270 degrees	90 degrees
line spacing	the equivalent of 100, 200, 300, 400 BMUs	any other positive integer
pairwise kerning	yes, no	none

The default value of these presentation attributes is as specified in this Recommendation.

B.4.3 *Control functions*

Control function	Basic value(s)	Non-basic value(s)
BS	not applicable	not applicable
CR	not applicable	not applicable
GCC	0, 1, 2	none
HPB	any positive integer	none
HPR	any positive integer	none
IGS	0	the identifier of any registered subrepertoire of ISO 6937
JFY	0	none
LF	not applicable	not applicable
PLD	not applicable	not applicable
PLU	not applicable	not applicable
SACS	any non-negative integer	none
SCS	any positive integer	none
SGR	0, 1, 3-4, 10-19, 21-24, 29, 50	2, 5-7, 25-27, 50
SHS	0, 1	2, 3, 4
SLS	any positive integer	none
SP	not applicable	not applicable
SRCS	any non-negative integer	none
SRS	0, 1	none
SSW	any positive integer	none
STAB	any	none
SUB	not applicable	not applicable
SVS	0, 1, 2, 3	4, 9
VPB	any positive integer	none
VPR	any positive integer	none

Any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

The default value of these control function parameters is as specified in this Recommendation.

B.5 *Character content architecture level CP-0*

B.5.1 *Type*

CP-3 is a character content architecture level pertaining to the processable character content architecture class.

B.5.2 *Presentation attributes*

Presentation attribute	Basic value(s)	Non-basic value(s)
alignment	start aligned centred justified	none
code extension announcers	any string of escape sequences in accordance with ISO 2022	none
graphic rendition	0, 4	none

The default value of these presentation attributes is as specified in this Recommendation.

It is assumed that all presentation attributes that are applicable to processable character content architectures, and that are not specified in the above table, have values equal to the default values specified in this Recommendation except:

– "graphic character subrepertoire": default value = 3.

B.5.3 *Control functions*

Control function	Basic value(s)	Non-basic value(s)
CR	not applicable	not applicable
LF	not applicable	not applicable
SUB	not applicable	not applicable

Any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

B.6 *Character content architecture level CP-2*

B.6.1 *Type*

CP-2 is a character content architecture level pertaining to the processable character content architecture class.

B.6.2 *Presentation attributes*

Presentation attribute	Basic value(s)	Non-basic value(s)
alignment	start aligned end aligned centred justified	none
character orientation	0 degrees	90 degrees
character path	0, 90 degrees	270 degrees

Presentation attribute	Basic value(s)	Non-basic value(s)
character spacing	the equivalent of 120 BMUs	the equivalent of 80, 100, 120 BMUs
code extension announcers	any string of escape sequences in accordance with ISO 2022	none
graphic character sets	the escape sequences to designate, and the locking shift functions to invoke, the graphic character sets of ISO 6937-2	the escape sequences to designate, and any required locking shift functions to invoke, any other registered graphic character sets
graphic character subrepertoire	3	the identifier of any registered subrepertoire of ISO 6937
graphic rendition	0, 4	1, 3, 10-19, 22-24, 26, 50
indentation	any non-negative integer	none
line layout table	1) any 2) any 3) start-aligned end-aligned centred aligned-around 4) any	none none none none
line progression	270 degrees	none
line spacing	the equivalent of 100, 200, 300, 400 BMUs	the equivalent of 150 BMUs

The default value of these presentation attributes is as specified in this Recommendation except "graphic character subrepertoire".

It is assumed that all presentation attributes that are applicable to processable character content architectures, and that are not specified in the above table, have values equal to the default values specified in this Recommendation.

B.6.3 *Control functions*

Control function	Basic value(s)	Non-basic value(s)
BPH	not applicable	not applicable
CR	not applicable	not applicable
IGS	3	the identifier of any other registered subrepertoire of ISO 6937
LF	not applicable	not applicable
NBH	not applicable	not applicable
PLD	not applicable	not applicable
PLU	not applicable	not applicable
SGR	0, 4	1, 3, 10-19, 22-24, 26, 50
SHS	0	1, 2, 3
SP	not applicable	not applicable
STAB	any	none
SUB	not applicable	not applicable
SVS	0, 1, 2, 3	4, 9

Any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

The default value of these control function parameters is as specified in this Recommendation except IGS (default value = 3).

B.7 *Character content architecture level CP-3*

B.7.1 *Type*

CP-3 is a character content architecture level pertaining to the processable character content architecture class.

B.7.2 *Presentation attributes*

Presentation attribute	Basic value(s)	Non-basic value(s)
alignment	start aligned end aligned centred justified	none
character fonts	1) none 2) none	any any
character orientation	0 degrees	90, 180, 270 degrees
character path	0, 90 degrees	180, 270 degrees

Presentation attribute	Basic value(s)	Non-basic value(s)
character spacing	the equivalent of 100, 120 BMUs	any other positive integer
code extension announcers	any string of escape sequences in accordance with ISO 2022	none
graphic character sets	the escape sequences to designate, and the locking shift functions to invoke, the graphic character sets of ISO 6937-2	the escape sequences to designate, and any required locking shift functions to invoke, any other registered graphic character sets
graphic character subrepertoire	0	the identifier of any registered subrepertoire of ISO 6937
graphic rendition	0, 1, 3-4, 9, 10-19, 21-24, 29	2, 5-7, 25-27, 50
first line offset	any integer	none
indentation	any non-negative integer	none
itemization	1) no itemization start-aligned end-aligned 2) any integer 3) any integer	none none none
kerning offset	1) any non-negative integer 2) any non-negative integer	none none
line layout table	1) any 2) any 3) start-aligned end-aligned centred aligned-around 4) any	none none none none
line progression	270 degrees	90 degrees
line spacing	the equivalent of 100, 200, 300, 400 BMUs	any other positive integer
orphan size	any positive integer	none
pairwise kerning	yes, no	none
proportional line spacing	yes, no	none
widow size	any positive integer	none

The default value of these presentation attributes is as specified in this Recommendation.

B.7.3 *Control functions*

Control function	Basic value(s)	Non-basic value(s)
BPH	not applicable	not applicable
CR	not applicable	not applicable
GCC	0, 1, 2	none
IGS	0	the identifier of any registered subrepertoire of ISO 6937
LF	not applicable	not applicable
NBH	not applicable	not applicable
PLD	not applicable	not applicable
PLU	not applicable	not applicable
PTX	0, 1, 3	none
SCS	any positive integer	none
SGR	0, 1, 3-4, 9, 10-19, 21-24, 29	2, 5-7, 25-27, 50
SHS	0, 1	2, 3, 4
SLS	any positive integer	none
SP	not applicable	not applicable
SRS	0, 1	none
STAB	any	none
SUB	not applicable	not applicable
SVS	0, 1, 2, 3	4, 9
VPB	any positive integer	none
VPR	any positive integer	none

Any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

The default value of these control function parameters is as specified in this Recommendation.

B.8 *Character content architecture level CFP-2*

B.8.1 *Type*

CFP-2 is a character content architecture level pertaining to the formatted processable character content architecture class.

B.8.2 *Presentation attributes*

Presentation attribute	Basic value(s)	Non-basic value(s)
alignment	start aligned end aligned centred justified	none
character orientation	0 degrees	90 degrees
character path	0, 90 degrees	270 degrees
character spacing	the equivalent of 120 BMUs	the equivalent of 80, 100, 120 BMUs
code extension announcers	any string of escape sequences in accordance with ISO 2022	none
graphic character sets	the escape sequences to designate, and the locking shift functions to invoke, the graphic character sets of ISO 6937-2	the escape sequences to designate, and any required locking shift functions to invoke, any other registered graphic character sets
graphic character subrepertoire	3	the identifier of any registered subrepertoire of ISO 6937
graphic rendition	0, 4	1, 3, 10-19, 22-24, 26, 50
initial offset	1) any non-negative integer 2) any non-negative integer	none none
indentation	any non-negative integer	none
line layout table	1) any 2) any 3) start-aligned end-aligned centred aligned-around 4) any	none none none none
line progression	270 degrees	none
line spacing	the equivalent of 100, 200, 300, 400 BMUs	the equivalent of 150 BMUs

The default value of these presentation attributes is as specified in this Recommendation except "graphic character subrepertoire".

It is assumed that all presentation attributes that are applicable to formatted processable character content architectures, and that are not specified in the above table, have values equal to the default values specified in this Recommendation except:

– graphic character subrepertoire: default value = 3.

B.8.3 *Control functions*

Control function	Basic value(s)	Non-basic value(s)
BPH	not applicable	not applicable
BS	not applicable	not applicable
CR	not applicable	not applicable
IGS	3	the identifier of any other registered subrepertoire of ISO 6937
LF	not applicable	not applicable
NBH	not applicable	not applicable
PLD	not applicable	not applicable
PLU	not applicable	not applicable
SGR	0, 4	1, 3, 10-19, 22-24, 26, 50
SHS	0	1, 2, 3
SOS	not applicable	not applicable
SP	not applicable	not applicable
ST	not applicable	not applicable
STAB	any	none
SUB	not applicable	not applicable
SVS	0, 1, 2, 3	4, 9

Any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

The default value of these control function parameters are as specified in this Recommendation except IGS (default value = 3).

B.9 *Character content architecture level CFP-3*

B.9.1 *Type*

CFP-3 is a character content architecture level pertaining to the formatted processable character content architecture class.

B.9.2 *Presentation attributes*

Presentation attribute	Basic value(s)	Non-basic value(s)
alignment	start aligned end aligned centred justified	none
character fonts	1) none 2) none	any any
character orientation	0 degrees	90, 180, 270 degrees
character path	0, 90 degrees	180, 270 degrees
character spacing	the equivalent of 100, 120 BMUs	any other positive integer
code extension announcers	any string of escape sequences in accordance with ISO 2022	none
formatting indicator	no, yes	none
graphic character sets	the escape sequences to designate, and the locking shift functions to invoke, the graphic character sets of ISO 6937-2	the escape sequences to designate, and any required locking shift functions to invoke, any other registered graphic character sets
graphic character subrepertoire	0	the identifier of any registered subrepertoire of ISO 6937
graphic rendition	0, 1, 3-4, 9, 10-19, 21-24, 29	2, 5-7, 25-27, 50
first line offset	any integer	none
initial offset	1) any non-negative integer 2) any non-negative integer	none none
indentation	any non-negative integer	none
itemization	1) no itemization start-aligned end-aligned 2) any integer 3) any integer	none none none

Presentation attribute	Basic value(s)	Non-basic value(s)
kerning offset	1) any non-negative integer 2) any non-negative integer	none none
line layout table	1) any 2) any 3) start-aligned end-aligned centred aligned-around 4) any	none none none none
line progression	270 degrees	90 degrees
line spacing	the equivalent of 100, 200, 300, 400 BMUs	any other positive integer
orphan size	any positive integer	none
pairwise kerning	yes, no	none
proportional line spacing	yes, no	none
widow size	any positive integer	none

B.9.3 *Control functions*

Control function	Basic value(s)	Non-basic value(s)
BPH	not applicable	not applicable
BS	not applicable	not applicable
CR	not applicable	not applicable
GCC	0, 1, 2	none
HPB	any positive integer	none
HPR	any positive integer	none
IGS	0	the identifier of any registered subrepertoire of ISO 6937
JFY	0	none
LF	not applicable	not applicable

Control function	Basic value(s)	Non-basic value(s)
NBH	not applicable	not applicable
PLD	not applicable	not applicable
PLU	not applicable	not applicable
PTX	0, 1, 3	none
SACS	any non-negative integer	none
SCS	any positive integer	none
SGR	0, 1, 3-4, 10-19, 21-24, 29	2, 5-7, 25-27, 50
SHS	0, 1	2, 3, 4
SLS	any positive integer	none
SOS	not applicable	not applicable
SP	not applicable	not applicable
SRCS	any non-negative integer	none
SRS	0, 1	none
SSW	any positive integer	none
ST	not applicable	not applicable
STAB	any	none
SUB	not applicable	not applicable
SVS	0, 1, 2, 3	4, 9
VPB	any positive integer	none
VPR	any positive integer	none

Any code extension control function defined in ISO 2022, within the scope of the value of the attribute "code extension announcers", is permitted.

ANNEX C

(to Recommendation T.416)

Coded representations of control functions

(Informative)

Coded representations of control functions are defined in ISO 6429. A summary of the coded representations of the control functions defined in this Recommendation is given below.

In this table, CSI denotes the Control Sequence Introducer represented by the bit-combination 09/11 and Pn and Ps denote respectively numeric and selective parameter values represented by one or more bit combinations in the range 03/00 to 03/09.

This coded representation of a control function with parameters but with Pn or Ps omitted represents that control function with the default value of the parameter.

Control function		Coded representation
BPH	(Break Permitted Here)	08/02
BS	(Backspace)	00/08
CR	(Carriage Return)	00/13
HPB	(Character Position Backward)	CSI Pn 06/10
HPR	(Character Position Relative)	CSI Pn 06/01
GCC	(Graphic Character Composition)	CSI Ps 02/00 05/15
IGS	(Identify Graphic Subrepertoire)	CSI Ps 02/00 04/13
JFY	(No Justify)	CSI 02/00 04/06
LF	(Line Feed)	00/10
NBH	(No Break Here)	08/03
PLD	(Partial Line Down)	08/11
PLU	(Partial Line Up)	08/12
PTX	(Parallel Texts)	CSI Ps 05/12
SCS	(Set Character Spacing)	CSI Pn 02/00 06/07
SGR	(Select Graphic Rendition)	CSI Ps... 06/13
SHS	(Select Character Spacing	CSI Ps 02/00 04/11
SACS	(Set Additional Character Spacing)	CSI Pn 02/00 05/12
SLS	(Set Line Spacing)	CSI Pn 02/00 06/08
SOS	(Start Of String)	09/08
SRCS	(Set Reduced Character Spacing)	CSI Pn 02/00 06/06
SSW	(Set SPACE Width)	CSI Pn 02/00 05/11
SP	(SPACE)	02/00
SRS	(Start Reverse String)	CSI Ps 05/11
ST	(String Terminator)	09/12
STAB	(Selective Tabulation)	CSI Ps 02/00 04/12
SUB	(Substitute)	01/10
SVS	(Select Line Spacing	CSI Ps 02/00 04/12
VPB	(Line Position Backward)	CSI Pn 06/11
VPR	(Line Position Relative)	CSI Pn 06/05

ANNEX D

(to Recommendation T.416)

Summary of object identifiers

(Informative)

Values of ASN.1 object identifiers are assigned in various sections in this Recommendation. These are summarised below:

Object identifier value	Meaning	Section
{ 2 8 1 6 2 }	Identifies module; character presentation attributes	9.2
{ 2 8 1 6 3 }	Identifies module; character coding attributes	9.3
{ 2 8 1 6 4 }	Identifies module; character profile attributes	9.4
{ 2 8 2 6 0 }	Identifies formatted character; content architecture class	7.4
{ 2 8 2 6 1 }	Identifies processable character; content architecture class	7.4
{ 2 8 2 6 2 }	Identifies formatted processable; character content architecture class	7.4
{ 2 8 3 6 0 }	Identifies ISO 2022 type of coding	8.1

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