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ETSI

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New presentation - see History box

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0 Foreword

This European Telecommunication Standard (ETS) was produced by the Terminal Equipment (TE) Technical Committee of the European Telecommunications Standards Institute (ETSI) and adopted in September 1990. This ETS is one of an integrated package of 5 ETSs covering various aspects of videotex which comprises:

ETS 300 073 Videotex presentation layer data syntax
Geometric Display
(CEPT Recommendation T/TE 06-02, Edinburgh 1988)

ETS 300 074 Videotex presentation layer data syntax transparent data
(CEPT Recommendation T/TE 06-03, Edinburgh 1988)

ETS 300 075 Terminal Equipment (TE);
Videotex processable data

ETS 300 076 Terminal Equipment;
Videotex
Terminal Facility Identifier (TFI)

This standard and its companion ETSs are based on previous CEPT Recommendations and two of them (ETSs 300 073 to 300 074) are CEPT Recommendations now endorsed as ETSs without modification.

For the purposes of this standard, all references within the text to the following T/TE or T/CD numbers should read as follows:

T/TE or T/CD 06-01 = ETS 300 072,

T/TE 06-02 = ETS 300 073,

T/TE 06-03 = ETS 300 074,

T/TE or T/CD 06-04 = ETS 300 075,

T/TE or T/CD 06-05 = ETS 300 076.

Recommendation T/TE 06-01
(formerly Recommendation T/CD 06-01)

(Innsbruck May 1981)
(Revised, Cannes, September 1983)
(Revised, Montpellier, June 1984)
(Revised, Nice, June 1985)
(Revised, Edinburgh, May 1988)
(Revised, October 1988)

CONCERNING THE VIDEOTEX SERVICE

The European Telecommunications Standards Institute

Considering:

- the work undertaken within CEPT with a view to harmonising international telecommunication services as well as equipment

- studies carried out within the framework of question CD7

- the possible benefit to the expansion of the Videotex service in providing a stable environment for the full commercial exploitation of existing services already implemented

- the possibility that some administrations require a lower cost basic service and others an enhanced service with extra facilities

- the need for a common standard which will enable administrations who wish to do so to confidently adopt the "harmonised enhanced" service or up grade a basic service to the "harmonised enhanced" service

- the need to leave the way open to add new facilities as technology progresses in a way which preserves investments in basic services or enhanced services.

Adopts the present standard, which implies that:

1 In order to facilitate international access between Videotex services in Europe:

1.1 International access to national Videotex services should be via PTT provided international gateways. (See Note 1 below.)

1.2 International gateways should intercommunicate using the communication protocols to be adopted by CEPT, the information being coded according to data syntax described in Annex A, with the range of information transmitted restricted to conform to the service reference model as described in Annex B.

1.3 Administrations should ensure that the coded information is transcoded as necessary in order to provide the best possible display on the terminals in use in that country. In addition, Administrations may provide identification of user and billing.

Note 1: Non PTT provided gateways may be used according to decisions made by national regulatory bodies for the provision of international videotex services.

2 In order to recognise existing systems and to harmonise further development of Videotex Services:

2.1 Systems offering a basic service shall be based on one of the four profiles described in Annex C (see Fig 1a)

2.2 An enhanced service of foreseen facilities is optional but where they are provided they shall conform to the standards referred to in Fig 1b.

2.3 New enhanced services which are either as yet unforeseen or not yet defined in sufficient detail in Annex B to make a recommendation at this stage shall be formulated such that they are:

I based on one of the four basic building blocks and the "harmonised enhanced" service

or

based on one of the four basic building blocks and be able to display information generated by systems using the "harmonised enhanced" service standard;

II able to be adopted without modifications to any parameters defined in the references given in Fig 1b.

2.4 a. Either new optional enhanced services which are either as yet unforeseen or not yet defined in sufficient detail in Annex B shall not be added to a system providing the basic service without also including the "harmonised enhanced" service referred to in Fig 1b.

b. Or new optional enhanced services which are either as yet unforeseen or not yet defined in sufficient detail in Annex B (Fig 1c) may be adopted without also adopting the facilities of the "harmonised enhanced" service standard referred to in Fig 1b. In this case at least full compatibility with CEPT Recommendation T/CD 06-01 version Innsbruck (May 1981) shall be assumed.

However it is preferable for both 1b and 1c in Figure 1 to be adopted if maximum inter-working between services is to be achieved at the earliest possible time.

3 Studies should continue on:

- New enhanced services which are not yet defined in sufficient detail in Annex B (photographic modes) so as to arrive at a common standard for them.

- International communication protocol.

4 In order to harmonise the interface to "external computers" for communication between external computers and Videotex centres, administrations should adopt the data syntax described in Annex A for the coding of information and common protocols for the other layers (possibly those referred to in 1.2 above).

FUTURE HORIZON

Fig 1c

STANDARD FOR NEW ENHANCED SERVICES AS YET UNFORESEEN OR NOT YET DEFINED IN SERVICES (OPTIONAL)

- must be based on one of the four basic building blocks and "harmonised enhanced" service

  or

  must be based on one of the four basic building blocks and be able to display information generated by systems using the harmonised enhanced service standard.

- must be able to be adopted without modifications to any parameters defined in the references given in Fig 1b

1ST HORIZON

Fig 1b

STANDARD FOR THE "HARMONISED ENHANCED" SERVICE (OPTIONAL)

Annex B	0	6
	1.1.2	6.2.2
	1.3.2	8
	1.4.1 and 1.4.2 (simultaneously)	10
	1.4.3 to 1.4.5	
	1.5 to 1.9	
	4	
	5	

Fig 1a

FLEXIBLE INITIAL BUILDING BLOCKS (alternatives)

Profile 1	Profile 2	Profile 3	Profile 4

See Rec 2.4 (Optional)

FIG 1 - CEPT RECOMMENDATION ON ENHANCED VIDEOTEX SERVICE AND ITS RELATIONSHIP WITH EXISTING BASIC VIDEOTEX SERVICE SYSTEMS AND NEW AS YET UNDEFINED FACILITIES

Annex A to Recommendation T/TE 06-01 (formerly T/CD 06-01)

Note 1: This annex is an integral part of the recommendation.
Note 2: All references to T/CD should be interpreted as T/TE.

CEPT

VIDEOTEX PRESENTATION LAYER DATA SYNTAX

Issue 6, October 1988
(A Revision of Issue 5, Edinburgh, May 1988)

VIDEOTEX PRESENTATION LAYER DATA SYNTAX

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1 INTRODUCTION

VIDEOTEX systems are text communication systems with the capability of a given level of pictorial representation and a repertoire of display attributes. The text and the pictures obtained are intended to be displayed using the current television (TV) raster standards of the different countries.

Videotex services will be provided in different ways in different countries. The Videotex services may be a distributed network of independent computers or a hierarchy of computers with external databases or a mixture of both. It is probable that in all countries Videotex terminals will primarily access the Videotex services via the switched telephone network, over which data is transmitted to a terminal which generates displays. Three types of display have been identified and are described and defined in this recommendation:

1. Alpha-mosaic

2. Geometric

3. Photographic

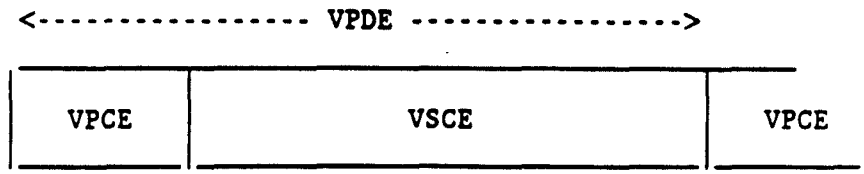
Other types of display may be defined in the future. Each type of display may be used simultaneously, though data for each type of display is separated during transmission. The way in which data is used to generate a display may be modified by 'management data'. Management data may affect more than one type of display.

1.1 Coding Principles

1.1.1 Identification Of Data Types

Different types of display data and management data are separated into different 'Videotex Presentation Data Elements' (VPDEs) during transmission.

'Videotex Presentation Data Elements' (VPDEs) are made up of two parts: 'Videotex Presentation Control Element' (VPCE) which identifies the type of data and 'Videotex Service Control Element' (VSCEs) which contain the data.



VPCEs are coded in the form US X where X is a character from:

columns 4-7 for alphamosaic data
column 2 for management data
column 3 for other data

The following VPCEs have been provisionally assigned:

TERMINAL FACILITY IDENTIFIER	US	2/0 and US 2/1
Define DRCS:	US	2/3
Define COLOUR:	US	2/6
Define FORMAT:	US	2/13
TIMING CONTROL	US	2/14
RESET	US	2/15
ALPHAMOSAIC display data:	US	<any character from column 4-7>
Reserved (see note 1)	US	3/0
GEOMETRIC display data (3D)	US	3/1
GEOMETRIC display data (2D)	US	3/2
PHOTOGRAPHIC pixel data	US	3/4
PHOTOGRAPHIC table data	US	3/5
SOUND	US	3/11
Reserved (see note 2)	US	3/12
TELESOFTWARE data	US	3/14
TRANSPARENT data	US	3/15

Note 1: US 3/0 is reserved for Geometric display data according to the Montpellier version of this recommendation.

Note 2: US 3/12 is reserved for private use.

US is the UNIT SEPARATOR control and is coded 1/15

1.1.2 Use of default values

Where data fields are used to describe parameters of the following data (eg. the DRCS header) default values for these fields have been assigned. If the data field is not transmitted then the terminal will apply the default value.

It is anticipated that some terminals will only be able to process data which conforms to these default values, to simplify their operation these terminals may ignore such data, unless the parameters describing that data are omitted (implying that the data conforms to the default).

It is therefore recommended that when a parameter is equal to the default value that field is not transmitted, if it is transmitted then the response of the terminal is not guaranteed.

1.2 Display Principles

1.2.1 Defined Display Area

The defined display area is a rectangular area of the screen within which the text and pictorial information is displayed.

The ratio of the width to the height (aspect ratio) of this area should be 4:3.

For the alphamosaic display this area is composed of a defined number of rows each with a defined number of character positions. The default is 24 rows of 40 character positions.

For the geometric display the bottom lefthand corner of the defined display area is addressed as (0,0) and the upper righthand corner is defined as (1,0.75).

The photographic display area also maps to the same area. The top lefthand pixel of the photographic display area is addressed as (1,1).

The possibility of defining different aspect ratios is for further study.

1.2.2 Display structure

The theoretical structure of the display consists of the following layers in order of precedence:

1. Alphamosaic character foreground and background layers (see Part 1 Section 1.2)
2. Geometric layer or layers (see Part 2)
3. Photographic layer (see Part 3)
4. Full screen background layer (see Part 1)
5. Any other video source

Changing the display structure is for further study.

2.0 REFERENCES

CCITT Recommendation T50	International alphabet No 5
CCITT Recommendation F300	Videotex service
CCITT Recommendation T100	International information exchange for interactive videotex
CCITT Recommendation T101, Annex C	International Interworking for Videotex Services
ISO Standard 2022 (Rev 86)	Code Extension Techniques for use with the ISO 7-bit and 8-bit coded character set
ISO Standard 6937	Information processing - coded character sets for text communication
ISO Standard 6429.2	Draft standard - additional control functions for character imaging devices
CEPT Recommendation T/SF 59	International Videotex Service

3.0 DEFINITIONS

BIT-COMBINATION
Bit-combination is an ordered set of bits that represents a character.

BORDER AREA
Border area is that part of the display screen (visible display) which is outside the defined display area. (See Note and Figure 1 below).

CONTROL CHARACTER
Control character is a control function, the coded representation of which consists of a single bit-combination.

CONTROL FUNCTION
Control function is an action that affects the recording, processing, transmission or interpretation of data. The coded representation of a control function consists of one or more bit-combinations.

DEFINED DISPLAY AREA
The defined display area is a rectangular area of the screen within which the text and pictorial information is displayed (see Figure 1 and section 1.2.1).

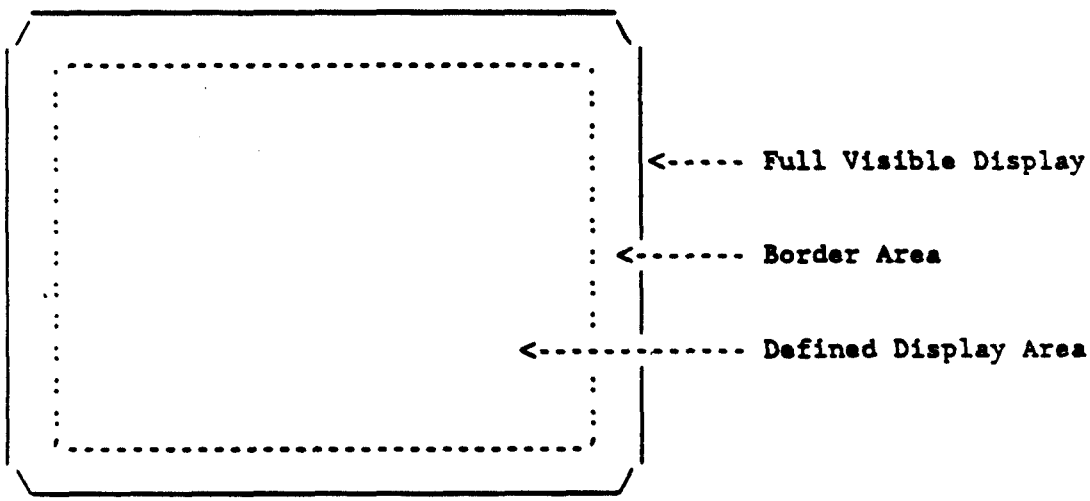


FIGURE 1 Full Visible Display, Border Area and Defined Display Area

NOTE

The default format of defined display area for the alphamosaic option is given in Part 1 Section 1.1.2

GRAPHIC CODE EXTENSION
Graphic code extension is the method of encoding graphic characters in excess of those which may be represented by the code combinations of the basic code table. Alternative sets of 94 characters may be designated by means of shift functions.

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1.0 DESCRIPTION

1.1 Introduction

Data sent to the terminal is used to generate alphamosaic displays in which text and graphic characters are displayed, usually in a fixed format of rows and columns.

1.1.1 Definitions

ACTIVE POSITION
Active position is the position on the screen from which subsequent actions would take place if they were activated.

BACKGROUND COLOUR
Background colour is the colour of that area of the character cell not occupied by the foreground colour.

CHARACTER
Character is a member of a set of elements that is used for organization, control or representation of data. A character repertoire contains two types of element: graphic characters and control functions.

CODED CHARACTER SET
Coded character set is a set of unambiguous rules that establishes a character set and their one-to-one relationship between the characters of the set and the bit-combinations.

CODE TABLE
Code table is a table showing the character corresponding to each bit-combination in a code. A code table is normally represented as a rectangular matrix of columns and rows.

FOREGROUND COLOUR
Foreground colour is the colour of the graphics shape that is being displayed in a character cell.

FORMAT EFFECTORS
Format effectors are control functions that influence the positioning of text and pictorial images, within the defined display area on a presentation device.

GRAPHIC CHARACTER
Graphic character is a character, other than a control function, that has a visual representation normally printed or displayed.

HOME POSITION
Home position is the first characacter position of the first row of the defined display area.

MARKERS
Markers are flags in a memory to show where attribute controls have been set; they are associated with the leading edge of the character position.

PARALLEL ATTRIBUTES
Parallel attributes are the property of the active position and move with it under the action of format effectors or spacing display characters (including space). They apply to the displayed characters subsequently received until the attributes are changed by relevant controls including certain format effectors (CS,APA,APH). They also apply to spacing display characters (including space) inserted by control commands.

SERIAL ATTRIBUTES
Serial attributes are set between markers on a row. They apply from the position of the active position at the time they are received to the end of the row or until a contradictory marker is reached.

WRAPAROUND CONTROLS
Wraparound controls comprise a set of rules which govern what happens when the active position attempts to move off the defined display area.

1.1.2 Format

The default format is 24 rows of 40 columns with automatic wraparound on rows and columns. . The format and wraparound may be changed by the 'Define FORMAT' VPDE.

1.1.3 Characters

Alphanumeric, block mosaic, smoothed mosaic and line drawing characters are defined. Accented characters are coded using the composition method of coding. The fixed repertoire of characters may be extended with dynamically redefinable characters loaded via the 'Define DRCS' VPDE.

1.1.4 Format Effectors

Characters may be positioned within the defined display area by means of format effector controls which move the active position, usually in units of one character position.

1.1.5 Attributes

The presentation of characters on the screen may be modified by the application of display attributes. Attributes may be applied to the full screen, full row, part of a row (serial) or to subsequently printed characters (parallel).

1.1.6 Device Control Functions

The action of scrolling, the display of the cursor and similar functions may be controlled by codes transmitted to the terminal.

1.2 Theoretical Terminal Model

The videotex service, alphamosaic option, may be described in the form of an ideally perfect theoretical terminal. This model is detailed hereafter.

1.2.1 Description

The theoretical terminal model is based on a separation between the visual content of the page and its structure. It can be described as if it were composed of three memories.

1. One character memory where one character address from the character generator is stored at every character location.

2. One attribute memory where all the attributes are set in parallel at every location of the screen plus registers for full screen and full row background. The number of registers in this memory is equal to the number of rows plus two. The last two registers refer to the top segment (above the defined display area) and the bottom segment (below the defined display area) of the full screen background.

3. One marker memory where every attribute or group of attributes or display functions may be flagged at any character location. When an attribute or function is modified according to the serial mode, this modification occurs between the current character location and the next flag related to this attribute or function (or up to the end of the row).

1.2.2 Operation of 'Parallel' and 'Serial' Mode Controls

Both the 'parallel' and 'serial' modes set only serial attributes in the terminal memory (which means that all attributes set, by either mode, are active between markers or up to the end of the row).

Parallel mode controls only apply attributes to the character locations where the cursor prints a character (including space), and remain with the cursor when it moves between rows except when the control codes CS, APA or APH are received. An attribute is copied into the attribute memory and markers are set wherever an attribute is changed. Whenever a continuous string of graphic characters, including SPACE, is written on a row under the parallel mode, then, if there is a change of attribute(s) between adjacent character locations, a marker(s) is created or moved. In addition, any existing markers within the overwritten part of the row are deleted.

Serial mode control codes insert or modify a marker into the marker memory and cause an attribute to be copied immediately into the attribute memory until a contradictory or complementary marker is encountered in the marker memory, or until the end of the row. When in the serial mode, the writing of a graphic character does not modify by itself the attribute in the attribute memory.

Parallel and Serial mode control codes are taken from different control sets and therefore may be unambiguously recognised by the terminal. This is achieved by invoking the appropriate Parallel or Serial C1 set.

The invocation of a Parallel or Serial C1 set will cause the mode of operation of the terminal to switch. Thus in the Serial mode any parallel attributes locked to the cursor will have no effect. Their effect will be restored when the Parallel mode is re-invoked.

Interaction of Serial and Parallel mode control codes: a subsequent (in time) Parallel mode control code will apply to all characters which the cursor writes while in the Parallel mode irrespective of how their attributes had been previously set.

A subsequent (in time) Serial mode control will propagate to the right of the cursor position at which it is received until it meets a contradictory marker.

A full row attribute (other than the background colour) has the effect of overwriting the defined attributes on all the positions of the row and has the effect of deleting all contradictory or complementary attribute markers. The full screen attribute has the same effect but written to all rows it does not delete markers.

1.2.3 Layered Structure

The alphamosaic display area acts as if it were composed of 2 independent layers.

- A full screen background layer which may be partitioned into rows (with time-dependent precedence).
- A defined display area character layer. The colour of this layer is either BACKGROUND COLOUR or FOREGROUND COLOUR.

As indicated in Part 0 of this document geometric and photographic layers may exist between the full screen background layer and the defined display area character layer.

1.2.4 Action of Attributes on Layers

The transparent colour in the defined display area character layer (foreground or background) allows see-through to the underlying full screen background layer or the geometric or photographic layers if present.

The character BACKGROUND COLOUR attribute, including the transparent value, applies only to the defined display area character layer.

The full screen and full row BACKGROUND COLOUR attribute affects only the full screen background layer. Its transparent value refers to the video picture.

The full screen, full row and parallel INVERT attribute-controls affect simultaneously and symmetrically the FOREGROUND and the BACKGROUND in the defined display area character layer.

All other full screen or defined display area attributes apply only to the foreground of the defined display area character layer (except the SIZE attribute which also affects the background of this layer). The actions of the combined effect of INVERT and the transparent colour are to be seen in Table 1.

TABLE 1 TRUTH TABLE FOR ATTRIBUTE SETTINGS

ATTRIBUTE SETTINGS			Colour of resultant display	
FOREGROUND/BACKGROUND	FOREGROUND	BACKGROUND	FOREGROUND and underline	BACKGROUND colour
NORMAL	Normal (c)	Normal (b)	c	b
		Transp. (b)	c	a
	Transp. (c)	Normal (b)	a	b
		Transp. (b)	a	a
INVERT	Normal (c)	Normal (b)	b	c
		Transp. (b)	a	c
	Transp. (c)	Normal (b)	b	a
		Transp. (c)	a	a

Foreground of defined display area character layer (c)
Background of the defined display area character layer (b)
Full screen background layer (a)

1.3 Defined Attributes and Qualified Areas

1.3.1 FOREGROUND COLOUR

This is the colour of the graphics shape being displayed. The colour may be any colour from the available colour tables including 'transparent' in which case the full screen background colour (or the geometric or photographic layers if present) is seen.

1.3.2 BACKGROUND COLOUR

CHARACTER BACKGROUND COLOUR
This is the colour of the remaining area of the character cell. The colour may be any colour from the available colour tables or be transparent in which case the full screen background colour (or the geometric or photographic leyers if present) is seen.

FULL SCREEN or FULL ROW BACKGROUND COLOUR
This is the colour of layer (a) of the theoretical model, see section 1.2.3.

1.3.3 LINED

Alphanumeric characters are displayed with an underline in which the underline is considered to be part of the shape of the graphics character. Mosaic characters and line drawing characters are displayed in separated font, see section 2.1.2.

1.3.4 SIZE

There are four states of character size:

NORMAL-SIZE
The extent of characters occupies the active position.

DOUBLE-HEIGHT
The extent of characters occupies both the active position and the corresponding position of the adjacent row.

DOUBLE-WIDTH
The extent of characters occupies both the active position and the next position of the same row.

DOUBLE-SIZE
The extent of characters occupies the active position, the next position on the same row and the corresponding two positions on the adjacent row.

See section 1.4 for rules for the application of the SIZE attribute.

1.3.5 FLASH

The following attribute states are defined:

STEADY
The characters are displayed normally.

FLASHING

NORMAL FLASH
The characters are displayed alternately in the prevailing foreground colour and in the prevailing background colour.

INVERTED FLASH
This is as for FLASH but on the inverted phase of the flashing clock.

REDUCED INTENSITY FLASH (flash between colour tables)
The characters are displayed alternately in the prevailing foreground colour and in the equivalent colour of another colour table. Table 1 colours adopt table 2 colours, table 2 colours adopt table 1 colours, table 3 colours adopt table 4 colours, and table 4 colours adopt table 3 colours. (See section 1.5.3).

STATES OF FLASHING

Each of the above states may be displayed at either of the following rates:

50% ON/OFF ratio at about 1Hz

33 % ON, 1st phase)
33 % ON, 2nd phase) at about 2Hz
33 % ON, 3rd phase)

1.3.6 CONCEAL

The characters are displayed as spaces until the user chooses to make them appear.

1.3.7 INVERT

The characters are displayed as if the foreground and background colours had been exchanged. If FLASH is applied the polarity of the flashing clock is also inverted.

1.3.8 WINDOW/BOX

The 'full screen background' of the character positions becomes transparent, ie the video picture is displayed.

1.3.9 MARKED

The characters are marked for further action at the terminal, eg to be transferred to an output device.

1.3.10 PROTECTED

The character positions are protected against alteration, manipulation or erasure. The protection is valid for attributes as well as characters.

Protected character positions may only be overwritten by the use of a specific code or by the action of the clear screen command (CS), which deletes both the characters and the protection.

Protected character positions may be scrolled and therefore may disappear from the screen, because the protection is always related to the particular information on the screen.

Protected characters must not be obscured by enlarged characters.

1.3.11 Scrolling Area

A scrolling area is an area within the defined display area, within which the characters and associated attributes move in increments of one character position under the action of format effectors or specific controls. The procedure of scrolling is defined by two processes:

1. The designation of the screen area inside which a scroll operation is to be executed;

2. The execution of the scrolling action.

The border of a scrolling area must not be crossed by an enlarged character. The action of a double-height command in the serial mode on the bottom row causes a scroll up, the writing of a double-height character in the parallel mode on the top row causes a scroll down.

The scrolling operation is applied to full rows; the scrolling of parts of rows is for further study.

The use of APA and APH allows the active positions to be moved across the borders of a scrolling area. The addressing of APA is relative to the defined display area and is independent of scrolling.

1.3.12 Colour Tables

Extension of the colour range is accomplished by providing a number of colour tables of 8 colours each. At a given instant only one table may be 'in use'; this table can be invoked using colour table controls.

The fixed repertoire of colours (plus transparent) may be extended with redefinable colours loaded via the 'Define COLOUR' VPDE.

1.4 Rules for the Action of the SIZE Attribute

In the parallel mode the application of the double-height control causes characters to be printed so that they occupy the character positions on the current row and on the row immediately above. The origin of the characters for subsequent attribute modification is the upper character position. The double-height and double-size controls are inactive on the top row of the defined display area. The writing of double-height character in the parallel mode on the top row of a scrolling area causes a scroll down.

In the serial mode double-height characters extend downwards, the origin of the character is the upper character position. The double-height and the double-size controls are inactive on the bottom row of the defined display area. The action of a double-height command in the serial mode on the bottom row of a scrolling area causes a scroll up.

Double-width characters extend to the right, the origin of the character is the left-hand character position. Alternate characters on the row are displayed.

The whole of an enlarged character is displayed with the attributes that apply to the origin of the character.

Parts of enlarged characters are not displayed, the double-width and double-size controls are inactive in the last character positions of a row.

Attributes set at obscured character positions do not take effect if they would break any of the above rules.

The application of a double-width attribute or a double-size attribute causes the cursor to move two character positions forward in both the serial and parallel modes when a character is written. The action of cursor control functions such as APB, APF and spacing attribute controls is not affected.

The application of one SIZE attribute terminates the action of any other SIZE attribute.

NOTE

Attention is drawn to the fact that the retention of characters obscured by enlarged characters and the overwriting of parts of enlarged characters is for further study.

1.5 Defaults

1.5.1 Default Initiation

The occurrence of certain events causes the default settings to be set. Table 2 below shows the events leading to the setting of a certain default. This is independent of the current mode of operation of the terminal.

TABLE 2 DEFAULT INITIATION

Default set	Full screen back-ground and device controls	Defined display area back-ground	Defined display area fore-ground	Cursor parallel attributes	Markers	Colour table and Scrolling area
Session start	x	x	x 3	x	x	x
CS		x	x 3	x	x	x
APA				x		
APH				x		
Full Row Attribute controls					x 1	
CAN					x 2	

1 For the related attribute in the row.

2 All the markers on the right of the active position up to the end of the row.

3 Default graphic character is SPACE.

1.5.2 Default Setting of Attributes

Full screen attributes are used as default conditions for defined display area attributes.

TABLE 3 DEFAULT SETTING OF ATTRIBUTES

Full screen background	Defined display area background and cursor	Defined display area foreground and cursor	Markers	Colour table	Scrolling
Black	Transparent	Colour white Normal size Unboxed Not concealed Steady Non-lined Not inverted Non-protected Unmarked	Off	Colour Table 1	Implicit Scrolling active No defined scrolling area

1.5.3 Default Colour Look-up Tables

CLUT1 addresses colours 0 - 7 of the colour map
CLUT2 " " 8 - 15 " " "
CLUT3 " " 16 - 23 " " "
CLUT4 " " 24 - 31 " " "

1.5.4 Default Colour Map

See Table 4

1.5.5 Default Device Controls

Cursor - off
Recording Device - stop
Hard Copy Device - stop
Auxillary Device - off
Display Device - on

1.5.6 Default Graphic Sets

G0 set - the primary set of graphic characters
G1 set - the second supplementary set of mosaic characters
G2 set - the supplementary set of graphic characters
G3 set - the third supplementary set of mosaic characters
L set - the first supplementary set of mosaic characters

FIGURE 1 COLOUR CONE

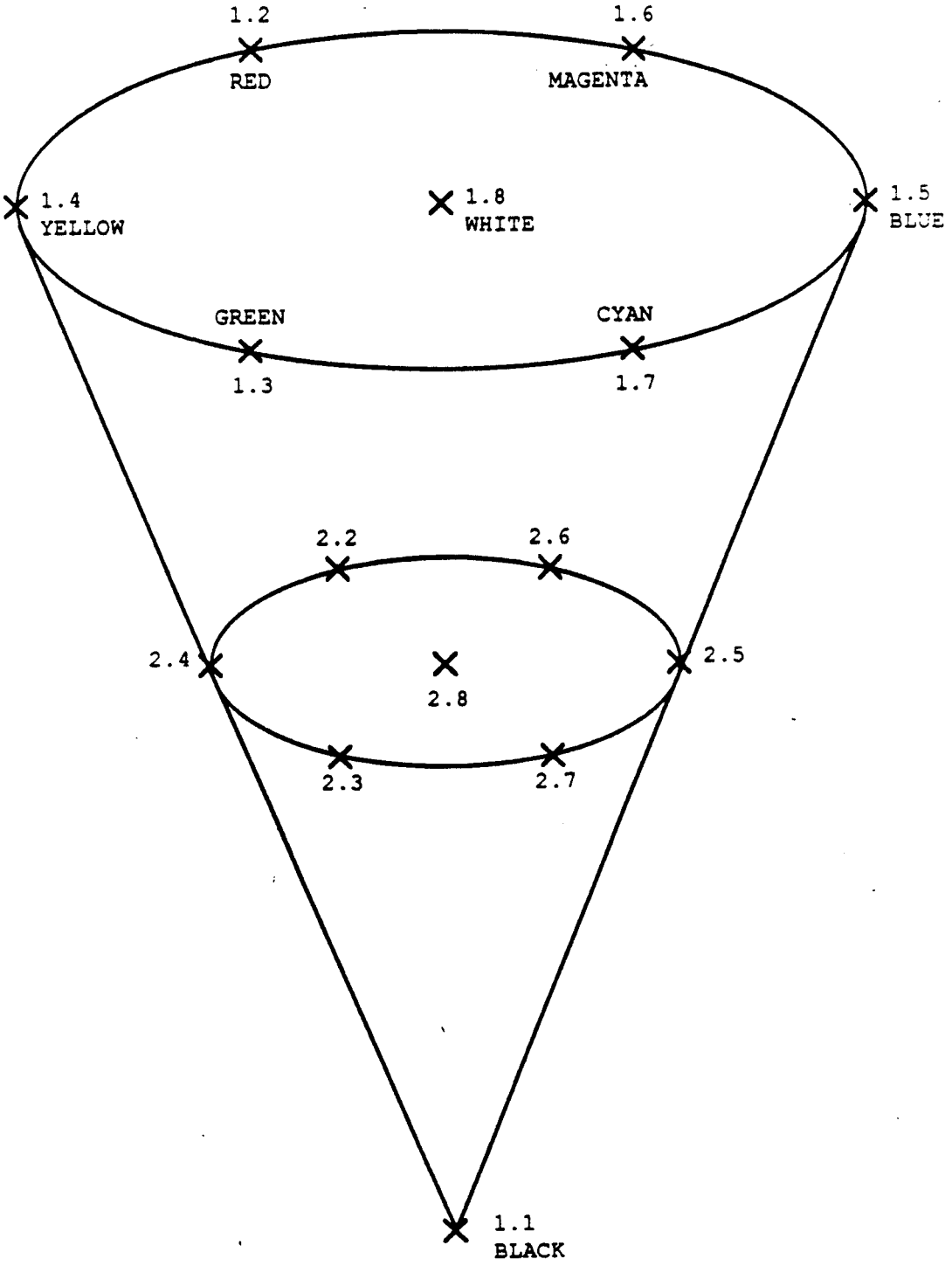


TABLE 4 RED GREEN AND BLUE COMPONENTS OF DEFAULT COLOUR MAP

Colour No		R	G	B	
0	BLACK	000000	000000	000000	
1	RED	111111	000000	000000	
2	GREEN	000000	111111	000000	
3	YELLOW	111111	111111	000000	
4	BLUE	000000	000000	111111	
5	MAGENTA	111111	000000	111111	
6	CYAN	000000	111111	111111	
7	WHITE	111111	111111	111111	
8	TRANSPARENT	--	--	--	*
9	REDUCED INTENSITY RED	011111	000000	000000	
10	" " GREEN	000000	011111	000000	
11	" " YELLOW	011111	011111	000000	
12	" " BLUE	000000	000000	011111	
13	" " MAGENTA	011111	000000	011111	
14	" " CYAN	000000	011111	011111	
15	GREY	011111	011111	011111	
16	BLACK	000000	000000	000000	
17	RED	111111	000000	000000	
18	GREEN	000000	111111	000000	
19	YELLOW	111111	111111	000000	
20	BLUE	000000	000000	111111	
21	MAGENTA	111111	000000	111111	
22	CYAN	000000	111111	111111	
23	WHITE	111111	111111	111111	
24	BLACK	000000	000000	000000	
25	RED	111111	000000	000000	
26	GREEN	000000	111111	000000	
27	YELLOW	111111	111111	000000	
28	BLUE	000000	000000	111111	
29	MAGENTA	111111	000000	111111	
30	CYAN	000000	111111	111111	
31	WHITE	111111	111111	111111	

NOTE

* If this entry (No 8) is defined as BLACK (as it is for default) it will be interpreted as TRANSPARENT.

2.0 REPERTORY

Alphamosaic presentation data is identified by the transmission of the ALPHAMOSAIC VPCE. The data following the VPCE may consist of any of the following repertoire of characters, format effectors, code extension controls, device controls or attribute controls.

2.1 Character Repertoire

The character repertoire consists of a fixed repertoire of alphanumeric characters, mosaic characters and line drawing characters. This fixed repertoire may be extended by the use of the DRCS option as described in part 4.

Characters of the fixed repertoire are identified according to the scheme described in Appendix A.

2.1.1 Alphanumeric Characters

The alphanumeric repertoire consists of the fixed repertoire of 405 characters listed below.

Latin alphabetic characters

Note: The G0 set is shown in Table 8.
The G2 set is shown in Table 9.

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS	CODE SET	CODE POS
LA01	a	small a	G0	6/1		
LA02	A	capital A	G0	4/1		
LA11	á	small a with acute accent	G2	4/2	G0	6/1
LA12	Á	capital A with acute accent	G2	4/2	G0	4/1
LA13	à	small a with grave accent	G2	4/1	G0	6/1
LA14	À	capital A with grave accent	G2	4/1	G0	4/1
LA15	â	small a with circumflex	G2	4/3	G0	6/1
LA16	Â	capital A with circumflex	G2	4/3	G0	4/1
LA17	ä	small a with diaeresis or umlaut	G2	4/8	G0	6/1
LA18	Ä	capital A with diaeresis or umlaut	G2	4/8	G0	4/1
LA19	ã	small a with tilde	G2	4/4	G0	6/1
LA20	Ã	capital A with tilde	G2	4/4	G0	4/1

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS	CODE SET	CODE POS
LA23	ă	small a with breve	G2	4/6	G0	6/1
LA24	Ă	capital A with breve	G2	4/6	G0	4/1
LA27	å	small a with ring	G2	4/10	G0	6/1
LA28	Å	capital A with ring	G2	4/10	G0	4/1
LA31	ā	small a with macron	G2	4/5	G0	6/1
LA32	Ā	capital A with macron	G2	4/5	G0	4/1
LA43	ą	small a with ogonek	G2	4/14	G0	6/1
LA44	Ą	capital A with ogonek	G2	4/14	G0	4/1
LA51	æ	small æ diphthong	G2	7/1		
LA52	Æ	capital Æ diphthong	G2	6/1		
LB01	b	small b	G0	6/2		
LB02	B	capital B	G0	4/2		
LC01	c	small c	G0	6/3		
LC02	C	capital C	G0	4/3		
LC11	ć	small c with acute accent	G2	4/2	G0	6/3
LC12	Ć	capital C with acute accent	G2	4/2	G0	4/3
LC15	ĉ	small c with circumflex	G2	4/3	G0	4/1
LC16	Ĉ	capital C with circumflex	G2	4/3	G0	4/1
LC21	č	small c with caron	G2	4/15	G0	6/3
LC22	Č	capital C with caron	G2	4/15	G0	4/3
LC29	ċ	small c with dot	G2	4/7	G0	6/3
LC30	Ċ	capital C with dot	G2	4/7	G0	4/3
LC41	ç	small c with cedilla	G2	4/11	G0	6/3
LC42	Ç	capital C with cedilla	G2	4/11	G0	4/3
LD01	d	small d	G0	6/4		
LD02	D	capital D	G0	4/4		

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS	CODE SET	CODE POS
LD21	ď or d̀	small d with caron	G2	4/15	G0	6/4
LD22	Ď	capital D with caron	G2	4/15	G0	4/4
LD61	đ	small d with stroke	G2	7/2		
LD62	Đ	capital D with stroke, Icelandic eth	G2	6/2		
LD63	ð	small eth, Icelandic	G2	7/3		
LE01	e	small e	G0	6/5		
LE02	E	capital E	G0	4/5		
LE11	é	small e with acute accent	G2	4/2	G0	6/5
LE12	É	capital E with acute accent	G2	4/2	G0	4/5
LE13	è	small e with grave accent	G2	4/1	G0	6/5
LE14	È	capital E with grave accent	G2	4/1	G0	4/5
LE15	ê	small e with circumflex	G2	4/3	G0	6/5
LE16	Ê	capital E with circumflex	G2	4/3	G0	4/5
LE17	ë	small e with diaeresis or umlaut	G2	4/8	G0	6/5
LE18	Ë	capital E with diaeresis or umlaut	G2	4/8	G0	4/5
LE21	ě	small e with caron	G2	4/15	G0	6/5
LE22	Ě	capital E with caron	G2	4/15	G0	4/5
LE29	ė	small e with dot	G2	4/7	G0	6/5
LE30	Ė	capital E with dot	G2	4/7	G0	4/5
LE31	ē	small e with macron	G2	4/5	G0	6/5
LE32	Ē	capital E with macron	G2	4/5	G0	4/5
LE43	ę	small e with ogonek	G2	4/14	G0	6/5
LE44	Ę	capital E with ogonek	G2	4/14	G0	4/5
LF01	f	small f	G0	6/6		
LF02	F	capital F	G0	4/6		
LG01	g	small g	G0	6/7		

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS	CODE SET	CODE POS
LG02	G	capital G	G0	4/7		
LG11	ǵ	small g with acute accent	G2	4/2	G0	6/7
LG15	ĝ	small g with circumflex	G2	4/3	G0	6/7
LG16	Ĝ	capital G with circumflex	G2	4/3	G0	4/7
LG23	ğ	small g with breve	G2	4/6	G0	6/7
LG24	Ğ	capital G with breve	G2	4/6	G0	4/7
LG29	ġ	small g with dot	G2	4/7	G0	6/7
LG30	Ġ	capital G with dot	G2	4/7	G0	4/7
LG42	Ģ	capital G with cedilla	G2	4/11	G0	4/7
LH01	h	small h	G0	6/8		
LH02	H	capital H	G0	4/8		
LH15	ĥ	small h with circumflex	G2	4/3	G0	6/8
LH16	Ĥ	capital H with circumflex	G2	4/3	G0	4/8
LH61	ħ	small h with stroke	G2	7/4		
LH62	Ħ	capital H with stroke	G2	6/4		
LI01	i	small i	G0	6/9		
LI02	I	capital I	G0	4/9		
LI11	í	small i with acute accent	G2	4/2	G0	6/9
LI12	Í	capital I with acute accent	G2	4/2	G0	4/9
LI13	ì	small i with grave accent	G2	4/1	G0	6/9
LI14	Ì	capital I with grave accent	G2	4/1	G0	4/9
LI15	î	small i with circumflex	G2	4/3	G0	6/9
LI16	Î	capital I with circumflex	G2	4/3	G0	4/9
LI17	ï	small i with diaeresis or umlaut	G2	4/8	G0	6/9
LI18	Ï	capital I with diaeresis or umlaut	G2	4/8	G0	4/9
LI19	ĩ	small i with tilde	G2	4/4	G0	6/9

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS	CODE SET	CODE POS
LI20	Ĩ	capital I with tilde	G2	4/4	G0	4/9
LI30	İ	capital I with dot	G2	4/7	G0	4/9
LI31	ī	small i with macron	G2	4/5	G0	6/9
LI32	Ī	capital I with macron	G2	4/5	G0	4/9
LI43	į	small i with ogonek	G2	4/14	G0	6/9
LI44	Į	capital I with ogonek	G2	4/14	G0	4/9
LI51	ij	small ij ligature	G2	7/6		
LI52	IJ	capital IJ ligature	G2	6/6		
LI61	ı	small i without dot	G2	7/5		
LJ01	j	small j	G0	6/10		
LJ02	J	capital J	G0	4/10		
LJ15	ĵ	small j with circumflex	G2	4/3	G0	6/10
LJ16	Ĵ	capital J with circumflex	G2	4/3	G0	4/10
LK01	k	small k	G0	6/11		
LK02	K	capital K	G0	4/11		
LK41	ķ	small k with cedilla	G2	4/11	G0	6/11
LK42	Ķ	capital K with cedilla	G2	4/11	G0	4/11
LK61	ĸ	small k, Greenlandic	G2	7/0		
LL01	l	small l	G0	6/12		
LL02	L	capital L	G0	4/12		
LL11	ĺ	small l with acute accent	G2	4/2	G0	6/12
LL12	Ĺ	capital L with acute accent	G2	4/2	G0	4/12
LL21	ľ or ʾl	small l with caron	G2	4/15	G0	6/12
LL22	Ľ or ʾL	capital L with caron	G2	4/15	G0	4/12
LL41	ļ	small l with cedilla	G2	4/11	G0	6/12
LL42	Ļ	capital L with cedilla	G2	4/11	G0	4/12

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS	CODE SET	CODE POS
LL61	ł	small l with stroke	G2	7/8		
LL62	Ł	capital L with stroke	G2	6/8		
LL63	ŀ	small l with middle dot	G2	7/7		
LL64	Ŀ	capital L with middle dot	G2	6/7		
LM01	m	small m	G0	6/13		
LM02	M	capital M	G0	4/13		
LN01	n	small n	G0	6/14		
LN02	N	capital N	G0	4/14		
LN11	ń	small n with acute accent	G2	4/2	G0	6/14
LN12	Ń	capital N with acute accent	G2	4/2	G0	4/14
LN19	ñ	small n with tilde	G2	4/4	G0	6/14
LN20	Ñ	capital N with tilde	G2	4/4	G0	4/14
LN21	ň	small n with caron	G2	4/15	G0	6/14
LN22	Ň	capital N with caron	G2	4/15	G0	4/14
LN41	ņ	small n with cedilla	G2	4/11	G0	6/14
LN42	Ņ	capital N with cedilla	G2	4/11	G0	6/14
LN61	ŋ	small eng, Lapp	G2	7/14		
LN62	Ŋ	capital eng, Lapp	G2	6/14		
LN63	ʼn	small n with apostrophe	G2	6/15		
LO01	o	small o	G0	6/15		
LO02	O	capital O	G0	4/15		
LO11	ó	small o with acute accent	G2	4/2	G0	6/15
LO12	Ó	capital O with acute accent	G2	4/2	G0	4/15
LO13	ò	small o with grave accent	G2	4/1	G0	6/15
LO14	Ò	capital O with grave accent	G2	4/1	G0	4/15
LO15	ô	small o with circumflex	G2	4/3	G0	6/15

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS	CODE SET	CODE POS
LO16	Ô	capital O with circumflex	G2	4/3	G0	4/15
LO17	ö	small o with diaeresis or umlaut	G2	4/8	G0	6/15
LO18	Ö	capital O with diaeresis or umlaut	G2	4/8	G0	4/15
LO19	õ	small o with tilde	G2	4/4	G0	6/15
LO20	Õ	capital O with tilde	G2	4/4	G0	4/15
LO25	ő	small o with double acute accent	G2	4/13	G0	6/15
LO26	Ő	capital O with double acute accent	G2	4/13	G0	4/15
LO31	ō	small o with macron	G2	4/5	G0	6/15
LO32	Ō	capital O with macron	G2	4/5	G0	4/15
LO51	œ	small œ ligature	G2	7/10		
LO52	Œ	capital Œ ligature	G2	6/10		
LO61	ø	small o with slash	G2	7/9		
LO62	Ø	capital O with slash	G2	6/9		
LP01	p	small p	G0	7/0		
LP02	P	capital P	G0	5/0		
LQ01	q	small q	G0	7/1		
LQ02	Q	capital Q	G0	5/1		
LR01	r	small r	G0	7/2		
LR02	R	capital R	G0	5/2		
LR11	ŕ	small r with acute accent	G2	4/2	G0	7/2
LR12	Ŕ	capital R with acute accent	G2	4/2	G0	5/2
LR21	ř	small r with caron	G2	4/15	G0	7/2
LR22	Ř	capital R with caron	G2	4/15	G0	5/2
LR41	ŗ	small r with cedilla	G2	4/11	G0	7/2
LR42	Ŗ	capital R with cedilla	G2	4/11	G0	5/2
LS01	s	small s	G0	7/3		

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS	CODE SET	CODE POS
LS02	S	capital S	G0	5/3		
LS11	ś	small s with acute accent	G2	4/2	G0	7/3
LS12	Ś	capital S with acute accent	G2	4/2	G0	5/3
LS15	ŝ	small s with circumflex	G2	4/3	G0	7/3
LS16	Ŝ	capital S with circumflex	G2	4/3	G0	5/3
LS21	š	small s with caron	G2	4/15	G0	7/3
LS22	Š	capital S with caron	G2	4/15	G0	5/3
LS41	ş	small s with cedilla	G2	4/11	G0	7/3
LS42	Ş	capital S with cedilla	G2	4/11	G0	5/3
LS61	ß	small sharp s, German	G2	7/11		
LT01	t	small t	G0	7/4		
LT02	T	capital T	G0	5/4		
LT21	ť	small t with caron	G2	4/15	G0	7/4
LT22	Ť	capital T with caron	G2	4/15	G0	5/4
LT41	ţ	small t with cedilla	G2	4/11	G0	7/4
LT42	Ţ	capital T with cedilla	G2	4/11	G0	5/4
LT61	ŧ	small t with stroke	G2	7/13		
LT62	Ŧ	capital T with stroke	G2	6/13		
LT63	þ	small thorn, Icelandic	G2	7/12		
LT64	Þ	capital thorn, Icelandic	G2	6/12		
LU01	u	small u	G0	7/5		
LU02	U	capital U	G0	5/5		
LU11	ú	small u with acute accent	G2	4/2	G0	7/5
LU12	Ú	capital U with acute accent	G2	4/2	G0	5/5
LU13	ù	small u with grave accent	G2	4/1	G0	7/5
LU14	Ù	capital U with grave accent	G2	4/1	G0	5/5

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS	CODE SET	CODE POS
LU15	û	small u with circumflex	G2	4/3	G0	7/5
LU16	Û	capital U with circumflex	G2	4/3	G0	5/5
LU17	ü	small u with diaeresis or umlaut	G2	4/8	G0	7/5
LU18	Ü	capital U with diaeresis or umlaut	G2	4/8	G0	5/5
LU19	ũ	small u with tilde	G2	4/4	G0	7/5
LU20	Ũ	capital U with tilde	G2	4/4	G0	5/5
LU23	ŭ	small u with breve	G2	4/6	G0	7/5
LU24	Ŭ	capital U with breve	G2	4/6	G0	5/5
LU25	ű	small u with double acute accent	G2	4/13	G0	7/5
LU26	Ű	capital U with double acute accent	G2	4/13	G0	5/5
LU27	ů	small u with ring	G2	4/10	G0	7/5
LU28	Ů	capital U with ring	G2	4/10	G0	5/5
LU31	ū	small u with macron	G2	4/5	G0	7/5
LU32	Ū	capital U with macron	G2	4/5	G0	5/5
LU43	ų	small u with ogonek	G2	4/14	G0	7/5
LU44	Ų	capital U with ogonek	G2	4/14	G0	5/5
LV01	v	small v	G0	7/6		
LV02	V	capital V	G0	5/6		
LW01	w	small w	G0	7/7		
LW02	W	capital W	G0	5/7		
LW15	ŵ	small w with circumflex	G2	4/3	G0	7/7
LW16	Ŵ	capital W with circumflex	G2	4/3	G0	5/7
LX01	x	small x	G0	7/8		
LX02	X	capital X	G0	5/8		
LY01	y	small y	G0	7/9		
LY02	Y	capital Y	G0	5/9		

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS	CODE SET	CODE POS
LY11	ý	small y with acute accent	G2	4/2	G0	7/9
LY12	Ý	capital Y with acute accent	G2	4/2	G0	5/9
LY15	ŷ	small y with circumflex	G2	4/3	G0	7/9
LY16	Ŷ	capital Y with circumflex	G2	4/3	G0	5/9
LY17	ÿ	small y with diaeresis or umlaut	G2	4/8	G0	7/9
LY18	Ÿ	capital Y with diaeresis or umlaut	G2	4/8	G0	5/9
LZ01	z	small z	G0	7/10		
LZ02	Z	capital Z	G0	5/10		
LZ11	ź	small z with acute accent	G2	4/2	G0	7/10
LZ12	Ź	capital Z with acute accent	G2	4/2	G0	5/10
LZ21	ž	small z with caron	G2	4/15	G0	7/10
LZ22	Ž	capital Z with caron	G2	4/15	G0	5/10
LZ29	ż	small z with dot	G2	4/7	G0	7/10
LZ30	Ż	capital Z with dot	G2	4/7	G0	5/10

Greek alphabetic characters

Note: The G0 set is shown in Table 13.
The G2 set is shown in Table 9.

ID	GRAPHIC	NAME OR DESCRIPTION	SET	POS		
GA01	α	small letter Alpha	G0	6/1		
GA02	A	capital letter Alpha	G0	4/1		
GA11	ά	small letter Alpha with accent	G2	4/2	G0	6/1
GA12	Ά	capital letter Alpha with accent	G2	4/2	G0	4/1
GB01	β	small letter Beta	G0	6/2		
GB02	B	capital letter Beta	G0	4/2		
GG01	γ	small letter Gamma	G0	6/3		
GG02	Γ	capital letter Gamma	G0	4/3		
GD01	δ	small letter Delta	G0	6/4		
GD02	Δ	capital letter Delta	G0	4/4		
GE01	ε	small letter Epsilon	G0	6/5		
GE02	E	capital letter Epsilon	G0	4/5		
GE11	έ	small letter Epsilon with accent	G2	4/2	G0	6/5
GE12	Έ	capital letter Epsilon with accent	G2	4/2	G0	4/5
GZ01	ζ	small letter Zeta	G0	6/6		
GZ02	Z	capital letter Zeta	G0	4/6		
GE61	η	small letter Eta	G0	6/7		
GE62	H	capital letter Eta	G0	4/7		
GE63	ή	small letter Eta with accent	G2	4/2	G0	6/7
GE64	Ή	capital letter Eta with accent	G2	4/2	G0	4/7
GT61	θ	small letter Theta	G0	6/8		
GT62	Θ	capital letter Theta	G0	4/8		
GI01	ι	small letter Iota	G0	6/9		
GI02	I	capital letter Iota	G0	4/9		
GI11	ί	small letter Iota with accent	G2	4/2	G0	6/9
GI12	Ί	capital letter Iota with accent	G2	4/2	G0	4/9

ID	GRAPHIC	NAME OR DESCRIPTION	SET	POS		
GI17	ϊ	small letter Iota with diaeresis	G2	4/8	G0	6/9
GI18	Ϊ	capital letter Iota with diaeresis	G2	4/8	G0	4/9
GI33	ΐ	small letter Iota with accent and diaeresis	G2	4/0	G0	6/9
GK01	κ	small letter Kappa	G0	6/10		
GK02	K	capital letter Kappa	G0	4/10		
GL01	λ	small letter Lambda	G0	6/11		
GL02	Λ	capital letter Lambda	G0	4/11		
GM01	μ	small letter Mu	G0	6/12		
GM02	M	capital letter Mu	G0	4/12		
GN01	ν	small letter Nu	G0	6/13		
GN02	N	capital letter Nu	G0	4/13		
GX01	ξ	small letter Xi	G0	6/14		
GX02	Ξ	capital letter Xi	G0	4/14		
GO01	ο	small letter Omicron	G0	6/15		
GO02	O	capital letter Omicron	G0	4/15		
GO11	ό	small letter Omicron with accent	G2	4/2	G0	6/15
GO12	Ό	capital letter Omicron with accent	G2	4/2	G0	4/15
GP01	π	small letter Pi	G0	7/0		
GP02	Π	capital letter Pi	G0	5/0		
GR01	ρ	small letter Rho	G0	7/1		
GR02	P	capital letter Rho	G0	5/1		
GS01	σ	small letter Sigma	G0	7/3		
GS02	Σ	capital letter Sigma	G0	5/3		
GS03	ς	small letter final Sigma	G0	7/2		
GT01	τ	small letter Tau	G0	7/4		
GT02	T	capital letter Tau	G0	5/4		
GY01	υ	small letter Upsilon	G0	7/5		

ID	GRAPHIC	NAME OR DESCRIPTION	SET	POS		
GY02	Υ	capital letter Upsilon	G0	5/5		
GY11	ύ	small letter Upsilon with accent	G2	4/2	G0	7/5
GY12	Ύ	capital letter Upsilon with accent	G2	4/2	G0	5/5
GY17	ϋ	small letter Upsilon with diaeresis	G2	4/8	G0	7/5
GY18	Ϋ	capital letter Upsilon with diaeresis	G2	4/8	G0	5/5
GY33	ΰ	small letter Upsilon with accent and diaeresis	G2	4/0	G0	7/5
GF01	φ	small letter Phi	G0	7/6		
GF02	Φ	capital letter Phi	G0	5/6		
GH01	χ	small letter Khi	G0	7/7		
GH02	Χ	capital letter Khi	G0	5/7		
GP61	ψ	small letter Psi	G0	7/8		
GP62	Ψ	capital letter Psi	G0	5/8		
GO61	ω	small letter Omega	G0	7/9		
GO62	Ω	capital letter Omega	G0	5/9		
GO63	ώ	small letter Omega with accent	G2	4/2	G0	7/9
GO64	ΰ	capital letter Omega with accent	G2	4/2	G0	5/9

Non-alphabetic characters

Decimal digits

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS
ND01	1	digit 1	G0	3/1
ND02	2	digit 2	G0	3/2
ND03	3	digit 3	G0	3/3
ND04	4	digit 4	G0	3/4
ND05	5	digit 5	G0	3/5
ND06	6	digit 6	G0	3/6
ND07	7	digit 7	G0	3/7
ND08	8	digit 8	G0	3/8
ND09	9	digit 9	G0	3/9
ND10	0	digit 0	G0	3/0

Currency signs

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS
SC01	¤	general currency sign	G2 (G0	2/3 2/4)
SC02	£	pound sign	G2	2/3
SC03	$	dollar sign	G2	2/4
SC04	¢	cent sign	G2	2/2
SC05	¥	yen sign	G2	2/5

Punctuation marks

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS
SP01		space	Gx	2/0
SP02	!	exclamation mark	G0	2/1
SP03	¡	inverted exclamation mark	G2	2/1
SP04	"	quotation mark	G0	2/2
SP05	'	apostrophe	G0	2/7
SP06	(	left parenthesis	G0	2/8
SP07	)	right parenthesis	G0	2/9
SP08	,	comma	G0	2/12
SP10	-	hyphen or minus sign	G0	2/13
SP11	.	full stop, period	G0	2/14
SP12	/	solidus	G0	2/15
SP13	:	colon	G0	3/10
SP14	;	semicolon	G0	3/11
SP15	?	question mark	G0	3/15
SP16	¿	inverted question mark	G2	3/15
SP17	<	angle quotation mark left	G2	2/11
SP18	>	angle quotation mark right	G2	3/11
SP19	‘	single quotation mark left	G2	2/9
SP20	’	single quotation mark right	G2	3/9
SP21	“	double quotation mark left	G2	2/10
SP22	”	double quotation mark right	G2	3/10

Note. In videotex 'quotation mark', 'apostrophe' and 'comma' are independent characters which cannot have the meaning of diacritical marks.

Arithmetic signs

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS
SA01	+	plus sign	G0	2/11
SA02	±	plus/minus sign	G2	3/1
SA03	<	less-than sign	G0	3/12
SA04	=	equals sign	G0	3/13
SA05	>	greater-than sign	G0	3/14
SA06	÷	divide sign	G2	3/8
SA07	×	multiply sign	G2	3/4

Subscripts and Superscripts

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS
NS01	¹	superscript 1	G2	5/1
NS02	²	superscript 2	G2	3/2
NS03	³	superscript 3	G2	3/3

Fractions

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS
NF01	½	fraction one half	G2	3/13
NF04	¼	fraction one quarter	G2	3/12
NF05	¾	fraction three quarters	G2	3/14

Miscellaneous symbols

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS
SM01	#	number sign	G0 G2	2/3 2/6
SM02	%	percent sign	G0	2/5
SM03	&	ampersand	G0	2/6
SM04	*	star	G0	2/10
SM05	@	commercial at	G0	4/0
SM06	[	left square bracket	G0	5/11
SM07	\	reverse solidus	G0	5/12
SM08	]	right square bracket	G0	5/13
SM11	{	left curly bracket	G0	7/11
SM12	—	central horizontal bar jointive	G2	5/0
SM13	|	central vertical bar jointive	G0	7/12
SM14	}	right curly bracket	G0	7/13
SM17	µ	micro sign	G2	3/5
SM18	Ω	ohm sign	G2	6/0
SM19	°	degree sign	G2	3/0
SM20	º	ordinal indicator, masculine	G2	6/11
SM21	ª	ordinal indicator, feminine	G2	6/3
SM24	§	section sign	G2	2/7
SM25	¶	paragraph sign, pilcrow	G2	3/6
SM26	·	middle dot	G2	3/7
SM30	←	leftward arrow	G2	2/12
SM31	→	rightward arrow	G2	2/14
SM32	↑	upward arrow	G2	2/13
SM33	↓	downward arrow	G2	2/15
SM34	■	delete	Gx	7/15
SM35	®	registered mark symbol	G2	5/2

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS
SM36	©	copyright symbol	G2	5/3
SM37	™	trade mark symbol	G2	5/4
SM38	♪	musical symbol	G2	5/5
SM39	⅛	one eighth	G2	5/12
SM40	⅜	three eighths	G2	5/13
SM41	⅝	five eighths	G2	5/14
SM42	⅞	seven eighths	G2	5/15
SM43	^	arrowhead upwards	G0	5/14
SM44	\	upper reverse solidus	G0	6/0
SM45	▏	left vertical bar jointive	G1	4/14
SM46	▕	right vertical bar jointive	G1	5/14
SM47	‾	upper bar	G0	7/14
SM48	_	lower bar	G0	5/15

Diacritical marks (as displayed when used in conjunction with SPACE)

ID	GRAPHIC	NAME OR DESCRIPTION	CODE SET	CODE POS
SD11	´	acute accent	G2	4/2
SD13	`	grave accent	G2	4/1
SD15	^	circumflex	G2	4/3
SD17	¨	umlaut or diaeresis	G2	4/8
SD19	~	tilde	G2	4/4
SD21	ˇ	caron	G2	4/15
SD23	˘	breve	G2	4/6
SD25	˝	double acute accent	G2	4/13
SD27	°	ring	G2	4/10
SD29	˙	dot	G2	4/7
SD31	¯	macron	G2	4/5
SD33	¨´	diaeresis with acute accent	G2	4/0
SD41	¸	cedilla	G2	4/11
SD43	˛	ogonek	G2	4/14

Note. G2 4/8 is diaeresis and is used for compatibility with other text communication services which may need to distinguish between umlaut and

2.1.2 Mosaic Graphics

In addition to the alphanumeric repertoire it is possible to make simple pictures using characters from the mosaic graphic repertoire defined below. Each mosaic character completely fills the area of a character cell on the screen.

The repertoire consists of:

63 graphics (block mosaic characters) consisting of a combination of six rectangular elements;

48 graphics (smoothed mosaic characters) where the shapes are bounded by lines between corners of six rectangular elements;

8 graphics (smoothed mosaic characters) where the a shapes are bounded by lines between the corners of the character cell and the centre of the character cell;

24 line drawing graphics;

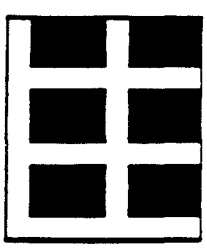
4 jointive arrows;

4 miscellaneous drawing graphics including one graphic with a dot-pattern where approximately 40% of the character cell area has the foreground colour and the remaining area has the background colour.

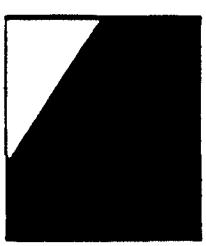
The shaded areas in the representations of the mosaic character are to be displayed in the defined foreground colour and the unshaded areas are to be displayed in the defined background colour.

The mosaic graphic character may be displayed in two fonts, 'contiguous' and 'seperated' as shown in the examples below. For the 'seperated' font the 'seperation space' is on the left and lower edge of the blocks. The actual dimension of the space is not defined.

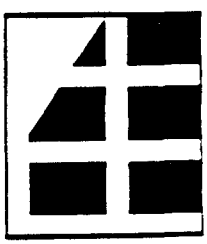
Contiguous Block Mosaic



Seperated Block Mosaic



Contiguos Smoothed Mosaic



Seperated Smoothed Mosaic

Block Mosaic Graphics

ID	GRAPHIC	CODE SET	CODE POS
MG01		G1	2/1
MG02		G1	2/2
MG03		G1	2/3
MG04		G1	2/4
MG05		G1	2/5
MG06		G1	2/6
MG07		G1	2/7
MG08		G1	2/8
MG09		G1	2/9
MG10		G1	2/10
MG11		G1	2/11
MG12		G1	2/12
MG13		G1	2/13
MG14		G1	2/14
MG15		G1	2/15

ID	GRAPHIC	CODE SET	POS
MG16		G1	3/0
MG17		G1	3/1
MG18		G1	3/2
MG19		G1	3/3
MG20		G1	3/4
MG21		G1	3/5
MG22		G1	3/6
MG23		G1	3/7
MG24		G1	3/8
MG25		G1	3/9
MG26		G1	3/10
MG27		G1	3/11
MG28		G1	3/12
MG29		G1	3/13
MG30		G1	3/14
MG31		G1	3/15

ID	GRAPHIC	CODE SET	POS
MG32		G1	6/0
MG33		G1	6/1
MG34		G1	6/2
MG35		G1	6/3
MG36		G1	6/4
MG37		G1	6/5
MG38		G1	6/6
MG39		G1	6/7
MG40		G1	6/8
MG41		G1	6/9
MG42		G1	6/10
MG43		G1	6/11
MG44		G1	6/12
MG45		G1	6/13
MG46		G1	6/14
MG47		G1	6/15

ID	GRAPHIC	CODE SET	POS
MG48		G1	7/0
MG49		G1	7/1
MG50		G1	7/2
MG51		G1	7/3
MG52		G1	7/4
MG53		G1	7/5
MG54		G1	7/6
MG55		G1	7/7
MG56		G1	7/8
MG57		G1	7/9
MG58		G1	7/10
MG59		G1	7/11
MG60		G1	7/12
MG61		G1	7/13
MG62		G1	7/14
MG63		G1	5/15

Smoothed Mosaic Graphics

ID	GRAPHIC	CODE SET	CODE POS
SG01		G1	4/0
SG02		G1	4/1
SG03		G1	4/2
SG04		G1	4/3
SG05		G1	4/4
SG06		G1	4/5
SG07		G1	4/6
SG08		G1	4/7
SG09		G1	4/8
SG10		G1	4/9
SG11		G1	4/10
SG12		G1	4/11
SG13		G1	4/12
SG14		G1	4/13

ID	GRAPHIC	CODE SET	POS
SG15		G1	5/13
SG16		G1	5/12
SG17		G1	5/11
SG18		G1	5/10
SG19		G1	5/9
SG20		G1	5/8
SG21		G1	5/7
SG22		G1	5/6
SG23		G1	5/5
SG24		G1	5/4
SG25		G1	5/3
SG26		G1	5/2
SG27		G1	5/1
SG28		G1	5/0

ID	GRAPHIC	CODE SET	POS
SG29		G3	6/0
SG30		G3	6/1
SG31		G3	6/2
SG32		G3	6/3
SG33		G3	6/4
SG34		G3	6/5
SG35		G3	6/6
SG36		G3	6/7
SG37		G3	6/8
SG38		G3	6/9
SG39		G3	6/10
SG40		G3	6/11
SG41		G3	6/12
SG42		G3	6/13

ID	GRAPHIC	CODE SET	POS
SG43		G3	7/0
SG44		G3	7/1
SG45		G3	7/2
SG46		G3	7/3
SG47		G3	7/4
SG48		G3	7/5
SG49		G3	7/6
SG50		G3	7/7
SG51		G3	7/8
SG52		G3	7/9
SG53		G3	7/10
SG54		G3	7/11
SG55		G3	7/12
SG56		G3	7/13

Line Drawing Graphics

ID	GRAPHIC	CODE SET	CODE POS
DG01		G3	4/0
DG02		G3	4/1
DG03		G3	4/2
DG04		G3	4/3
DG05		G3	4/4
DG06		G3	4/5
DG07		G3	4/6
DG08		G3	4/7
DG09		G3	4/8
DG10		G3	4/9
DG11		G3	4/10
DG12		G3	4/11
DG13		G3	4/12

ID	GRAPHIC	CODE SET	CODE POS
DG14		G3	5/0
DG15		G3	5/1
DG16		G3	5/2
DG17		G3	5/3
DG18		G3	5/4
DG19		G3	5/5
DG20		G3	5/6
DG21		G3	5/7
DG22		G3	5/8
DG23		G3	5/9
DG24		G3	5/10

ID	GRAPHIC	CODE SET	POS
DG25		G3	5/11
DG26		G3	5/12
DG27		G3	5/13
DG28		G3	5/14
DG29		G3	4/13
DG30		G3	4/14
DG31		G3	4/15
DG32		G1	4/15

2.2 Format Effector Repertoire

Abbreviation	Name and Definition
APA	ACTIVE POSITION ADDRESSING A format effector which causes the active position to move to a defined position on the screen in accordance with parameters following.
APB	ACTIVE POSITION BACK A format effector which causes the active position to move backwards one character position on the same row. APB on the first character position on the row moves the active position to the last character position of the preceding row. APB on the first character position of the first row moves the active position to the last character position of the last row in the defined display area.
APF	ACTIVE POSITION FORWARD A format effector which causes the active position to move forward to the next character position on the same row. At the last position on he row, this format effector moves the active position to the first character position on the following row. APF on the last character of the last row moves the active position to the first character position on the first row in the defined display area.
APD	ACTIVE POSITION DOWN A format effector which causes the active position to move to the equivalent character position on the following row. APD on the last row moves the active position to the equivalent character position on the first row in the defined display area.
APU	ACTIVE POSITION UP A format effector which causes the active position to move to the equivalent character position on the preceding row. APU on the first row moves the active position to the equivalent character position on the last row in the defined display area.
APR	ACTIVE POSITION RETURN A format effector which causes the active position to move to the first character position of the same row.
APH	ACTIVE POSITION HOME A format effector which causes the active position to be moved to the first character position of the first row of the defined display area.
CS	CLEAR SCREEN A format effector which causes the active position to be moved to the first character position of the first row in the defined display area and causes all character positions to be filled with spaces with all attributes set to the default conditions as decribed in Section 1.5.

CAN — CANCEL

A control function which fills all character positions from the active position to the end of the row inclusive with spaces. The active position is then returned to its previous location.

SP — SPACE

A format effector which advances the active position one character-width forward on the same row. (It is also regarded as a graphic character with no foreground. In those systems which define an explicit background, the space copies the background colour into the active position and moves the active position one character-width forward. If used in conjunction with the inversion attribute it copies the foreground colour into the active position and moves the active position one character width forward.) SPACE on the last character position of a row moves the active position to the first position of the next row. SPACE on the last character position of a frame moves the active position to the first character position of the frame.

RPT — REPEAT

A format effector which causes the immediatly preceding complete graphic character, including SPACE and DEL, to be displayed a number of times as defined by a parameter.

DEL — DELETE

In the mosaic graphics mode the use of DEL moves the active position one space forward, with the vacated space obliterated with the foreground colour. Attributes (double-height, colour, etc.) remain in force.

In the alphanumeric mode the use of DEL moves the active position one space forward and displays the DELETE graphics character in the vacated position.

DEL on the last character position of a row moves the active position to the first position of the next row. DEL on the last character position of a frame moves the active position to the first character position of the frame.

HMS — HOLD MOSAIC

When the mosaic graphics set is activated this function causes the last received mosaic graphic character to be displayed in its previously defined rendition when a serial attribute control function is transmitted.

RMS — RELEASE MOSAIC

Causes the action of HOLD MOSAIC to be stopped.

2.3 Attribute Control Repertoire

An attribute control causes the desired display attribute to be applied to the display graphic characters referenced. Four types of attribute control are defined:

Full screen attribute controls -
These affect all the the character positions on the screen, except the full screen background colour control which affects the full screen background layer.

Full row attribute controls -
These affect all the character positions on the defined row, except the full row background colour control which affects the defined row of the full screen background layer.

Serial attribute controls
These apply between markers on a row. They apply from the location of the active position at the time they are received to the end of the row or until a contradictory marker is reached. Each of the control functions of this repertoire causes the active position to be advanced one character width forwards; the position thus vacated is to be generally displayed as a SPACE. The control HOLD MOSAICS may modify this display. Combinations of control functions may be applied at one character location.

Parallel attribute controls -
These are the property of the active position and move with it under the action of format effectors or spacing display characters (including space). They apply to the displayed characters subsequently received until the attributes are changed by relevant controls including certain format effectors (CS, APA, APH). They also apply to spacing display characters (including space) inserted by control commands.

2.3.1 FOREGROUND COLOUR Controls

(a) Full screen and Full row controls

The following controls are available as either full screen or full row controls.

The FOREGROUND COLOUR may be set to any one of the eight colours of the currently invoked colour table using the following controls.

Abbreviation	Name and Definition
BKF	BLACK FOREGROUND Invokes 1st colour of the colour table
RDF	RED FOREGROUND Invokes 2nd colour of the colour table
GRF	GREEN FOREGROUND Invokes 3rd colour of the colour table
YLF	YELLOW FOREGROUND Invokes 4th colour of the colour table
BLF	BLUE FOREGROUND Invokes 5th colour of the colour table
MGF	MAGENTA FOREGROUND Invokes 6th colour of the colour table
CNF	CYAN FOREGROUND Invokes 7th colour of the colour table
WHF	WHITE FOREGROUND Invokes 8th colour of the colour table

(b) Serial controls

The FOREGROUND COLOUR may be set to any one of the eight colours of the currently invoked colour table. The same controls are also used to shift into or out of the first mosaic set (the L set).

The following 'alpha' foreground colour controls cause the appropriate foreground colour to be applied and a locking shift from the first mosaic set (the L set) back to the previously invoked G set.

Abbreviation	Name and Definition
ABK	ALPHA BLACK Invokes 1st colour of the colour table
ANR	ALPHA RED Invokes 2nd colour of the colour table
ANG	ALPHA GREEN Invokes 3rd colour of the colour table
ANY	ALPHA YELLOW Invokes 4th colour of the colour table
ANB	ALPHA BLUE Invokes 5th colour of the colour table
ANM	ALPHA MAGENTA Invokes 6th colour of the colour table
ANC	ALPHA CYAN Invokes 7th colour of the colour table
ANW	ALPHA WHITE Invokes 8th colour of the colour table

The following 'mosaic' foreground colour controls cause the appropriate foreground colour to be applied and a locking shift to the first mosaic set (the L set). A shift back from the first mosaic set (the L set) to the previously invoked G set is implicit at the start of each row.

Abbreviation	Name and Definition
MBK	MOSAIC BLACK Invokes 1st colour of the colour table
MSR	MOSAIC RED Invokes 2nd colour of the colour table
MSG	MOSAIC GREEN Invokes 3rd colour of the colour table
MSY	MOSAIC YELLOW Invokes 4th colour of the colour table
MSB	MOSAIC BLUE Invokes 5th colour of the colour table
MSM	MOSAIC MAGENTA Invokes 6th colour of the colour table
MSC	MOSAIC CYAN Invokes 7th colour of the colour table
MSW	MOSAIC WHITE Invokes 8th colour of the colour table

(c) Parallel controls

The foreground colour may be set to any one of the eight colours of the currently invoked colour table using the following controls.

Abbreviation	Name and Definition
BKF	BLACK FOREGROUND Invokes 1st colour of the colour table
RDF	RED FOREGROUND Invokes 2nd colour of the colour table
GRF	GREEN FOREGROUND Invokes 3rd colour of the colour table
YLF	YELLOW FOREGROUND Invokes 4th colour of the colour table
BLF	BLUE FOREGROUND Invokes 5th colour of the colour table
MGF	MAGENTA FOREGROUND Invokes 6th colour of the colour table
CNF	CYAN FOREGROUND Invokes 7th colour of the colour table
WHF	WHITE FOREGROUND Invokes 8th colour of the colour table

2.3.2 BACKGROUND COLOUR Controls

(a) Full screen and Full row controls

The following controls are available as either full screen or full row controls. They cause the full screen background layer to adopt one of the eight colours of the currently invoked colour table or transparency.

Abbreviation	Name and Definition
BKB	BLACK BACKGROUND Invokes 1st colour of the colour table
RDB	RED BACKGROUND Invokes 2nd colour of the colour table
GRB	GREEN BACKGROUND Invokes 3rd colour of the colour table
YLB	YELLOW BACKGROUND Invokes 4th colour of the colour table
BLB	BLUE BACKGROUND Invokes 5th colour of the colour table
MGB	MAGENTA BACKGROUND Invokes 6th colour of the colour table
CNB	CYAN BACKGROUND Invokes 7th colour of the colour table
WHB	WHITE BACKGROUND Invokes 8th colour of the colour table
TRB	TRANSPARENT BACKGROUND Invokes transparent background (the underlying video picture)

(b) Serial controls

The following controls affect the character background.

Abbreviation	Name and Definition
NBD	NEW BACKGROUND Causes the BACKGROUND COLOUR to adopt the current foreground colour as defined by previous colour controls. The foreground colour is unchanged.
BBD	BLACK BACKGROUND Causes the BACKGROUND COLOUR to invoke the first colour of the colour table.

(c) Parallel controls

The following controls cause the character background layer (layer b) to adopt one of the eight colours of the currently invoked colour table or transparency.

Abbreviation	Name and Definition
BKB	**BLACK BACKGROUND** **Invokes 1st colour of the colour table**
RDB	**RED BACKGROUND** **Invokes 2nd colour of the colour table**
GRB	**GREEN BACKGROUND** **Invokes 3rd colour of the colour table**
YLB	**YELLOW BACKGROUND** **Invokes 4th colour of the colour table**
BLB	**BLUE BACKGROUND** **Invokes 5th colour of the colour table**
MGB	**MAGENTA BACKGROUND** **Invokes 6th colour of the colour table**
CNB	**CYAN BACKGROUND** **Invokes 7th colour of the colour table**
WHB	**WHITE BACKGROUND** **Invokes 8th colour of the colour table**
TRB	**TRANSPARENT BACKGROUND** **Invokes Transparent background**

2.3.3 LINING Controls

The following controls are available as full screen, full row, serial or parallel controls.

Abbreviation	Name and Definition
STL	START LINING Applies the LINED attribute
SPL	STOP LINING Stops the application of the LINED attribute

2.3.4 SIZE Controls

(a) Full screen and full row controls

The following control is available either as a full screen or full row control.

Abbreviation	Name and Definition
NSZ	NORMAL-SIZE Applies the NORMAL-SIZE attribute

(b) Serial and parallel controls

The following controls are available in both the serial and parallel modes.

Abbreviation	Name and Definition
NSZ	NORMAL-SIZE Applies the NORMAL-SIZE attribute
DBH	DOUBLE-HEIGHT Applies the DOUBLE-HEIGHT attribute
DBW	DOUBLE-WIDTH Applies the DOUBLE-WIDTH attribute
DBS	DOUBLE-SIZE Applies the DOUBLE-SIZE attribute

NOTE

As described in section 1.4, the action of the DOUBLE-HEIGHT control is different in the serial and parallel modes.

2.3.5 FLASH Controls

(a) Full screen and full row controls

The following controls are available as either full screen or full row controls.

Abbreviation	Name and Definition
FSH	FLASH Applies the normal (50%) FLASH attribute
STD	STEADY Cancels the application of any FLASH attribute

(b) Serial and parallel controls

The following controls are available in both the serial and parallel modes.

State controls:

Abbreviation	Name and Definition
FSH	FLASH Applies the normal flash state
STD	STEADY Cancels the application of any flash attribute
IVF	INVERTED FLASH Applies the inverted flash state
RIF	REDUCED INTENSITY FLASH (flash between colour tables) Applies the reduced intensity flash state

Rate controls:

Abbreviation	Name and Definition
FF1	FAST FLASH 1 Applies the 1st phase of three-phase flash
FF2	FAST FLASH 2 Applies the 2nd phase of three-phase flash
FF3	FAST FLASH 3 Applies the 3rd phase of three-phase flash

NOTE

The application of any of the state controls defaults to the normal 50% 1Hz rate.

Abbreviation	Name and Definition
ICF	INCREMENT FLASH Three-phase fast flash is applied to characters so that the phase is sequentially changed for every character (enlarged characters count as single characters) in a string of three adjacent characters to produce an apparent movement to the right.
DCF	DECREMENT FLASH Three-phase fast flash is applied to characters so that the phase is sequentially changed for every character (enlarged characters count as single characters) in a string of three adjacent characters to produce an apparent movement to the left.

2.3.6 CONCEAL Controls

(a) Full screen and full row attributes

The following controls are available as either full screen or full row controls.

Abbreviation	Name and Definition
CDY	CONCEAL DISPLAY Applies the CONCEAL attribute
STC	STOP CONCEAL Causes the concealed characters to be revealed

(b) Serial and parallel controls

The following controls are available in both the serial and parallel modes.

Abbreviation	Name and Definition
CDY	CONCEAL DISPLAY Applies the CONCEAL attribute
STC	STOP CONCEAL Stops the application of the CONCEAL attribute

At full screen and full row level there is no need for a 'non-concealed' control; the 'stop conceal' control is interpreted as 'reveal' and also resets the character positions addressed to the 'not concealed' state.

2.3.7 INVERT Controls

(a) Full screen, full row and parallel controls

The following controls are available as either full screen, full row or parallel controls.

Abbreviation	Name and Definition
IPO	INVERTED POLARITY Applies the INVERT attribute
NPO	NORMAL POLARITY Stops the application of the INVERT attribute

(b) Serial controls - none.

2.3.8 WINDOW/BOX Controls

The following controls are available as either full screen, full row, serial or parallel controls.

Full screen controls affect the whole of the defined display area.

Full row controls affect whole rows within the defined display area.

Serial and parallel controls affect parts of rows and individual characters respectively.

Abbreviation	Name and Definition
SBX	START BOX Applies the WINDOW/BOX attribute
EBX	END BOX Stops the application of the WINDOW/BOX attribute

2.3.9 MARKING Controls

The following controls are available as either full screen, full row, serial or parallel controls.

Full screen controls affect the whole of the defined display area.

Full row controls affect whole rows within the defined display area.

Serial and parallel controls affect parts of rows and individual characters respectively.

Abbreviation	Name and Definition
MMS	MARKED MODE START Applies the MARKED attribute
MMT	MARKED MODE STOP Stops the application of the MARKED attribute

2.3.10 PROTECTING Controls

(a) Full screen, full row, serial and parallel controls
The following controls are available as either full screen, full row, serial or parallel controls.

Full screen controls affect the whole of the defined display area.

Full row controls affect whole rows within the defined display area.

Serial and parallel controls affect parts of rows and individual characters respectively.

Abbreviation	Name and Definition
PMS	PROTECTED MODE START Applies the PROTECTED attribute
PMC	PROTECTED MODE CANCEL Cancels (removes) the PROTECTED attribute (allows overwriting)

(b) Additional serial and parallel controls
The following controls may be applied in either the serial or parallel mode.

Abbreviation	Name and Definition
PMI	PROTECTED MODE IDLE Stops the application of the PROTECTED attribute

2.3.11 Definition of Scrolling Area

Abbreviation	Name and Definition
CSA	CREATE SCROLLING AREA Creates a scrolling area
DSA	DELETE SCROLLING AREA Deletes all or part of a scrolling area

2.3.12 Execution of Scrolling

(a) Implicit scrolling

Scroll up
APF, or the printing of a character or spacing attribute control on the last character position, or APD in the lowest row of the selected part of the screen, copies the contents of row i to i-1. The contents of the uppermost row of the selected part of the screen will be discarded. The lowest row of the selected part of the screen is filled with spaces (2/0) but the off-screen row-defined attributes remain unchanged. Thus the lowest row will show spaces in the row-defined background colour.

Scroll down
APB on the first character position, or APU in the uppermost row of the selected part of the screen, copies the contents of row i to row i + 1. The contents of the lowest row of the selected part of the screen will be discarded. The uppermost row of the selected part of the screen is filled with spaces (2/0) but the off-screen row-defined attributes remain unchanged. Thus the uppermost row will show spaces in the row-defined background colour.

Abbreviation	Name and Definition
DIS	DEACTIVATE IMPLICIT SCROLLING This deactivates the implicit scrolling, allowing the active position in to move across the border of a scrolling area
AIS	ACTIVATE IMPLICIT SCROLLING This restores the implicit scrolling effect of format effectors

(b) Explicit scrolling

These controls affect the scrolling area.

Abbreviation	Name and Definition
SCU	SCROLL UP This causes a scrolling up of the designated scrolling area
SCD	SCROLL DOWN This causes a scroll down of the designated area. The active position does not move relative to the defined display area.

2.3.13 Colour Table Controls

The following controls invoke the selected colour table.

Abbreviation	Name and Definition
CT1	COLOUR TABLE 1 Invokes 1st colour table
CT2	COLOUR TABLE 2 Invokes 2nd colour table
CT3	COLOUR TABLE 3 Invokes 3rd colour table
CT4	COLOUR TABLE 4 Invokes 4th colour table

These controls are Locking controls and are reset by a contradictory control or clear screen (CS). Invoking a colour table has no effect on an attribute until that attribute is changed.

2.4 Device Control Function Repertoire

2.4.1 Cursor Controls

Abbreviation	Name and Definition
CON	CURSOR ON A device control function which causes the active position to be indicated
COF	CURSOR OFF A device control function which terminates the action of CON

2.4.2 Recording Device Controls

Abbreviation	Name and Definition
RDS	RECORDING DEVICE START Causes the associated recording device to start recording data subsequently received by the terminal
RDT	RECORDING DEVICE STOP Causes the associated recording device to stop
RDW	RECORDING DEVICE WAIT Causes the associated recording device to wait

2.4.3 Hard Copy Device Controls

Abbreviation	Name and Definition
HCS	HARD COPY START Causes the associated hard copy device to start copying data subsequently received by the terminal
HCT	HARD COPY STOP Causes the associated hard copy device to stop
HCW	HARD COPY WAIT Causes the associated hard copy device to wait

2.4.4 Display Device Controls

Abbreviation	Name and Definition
DDO	DISPLAY DEVICE ON Data subsequently received by the terminal is displayed
DDF	DISPLAY DEVICE OFF Data subsequently received by the terminal is not displayed

2.4.5 Auxiliary Device Controls

Abbreviation	Name and Definition
ADO	AUXILIARY DEVICE ON Data subsequently received by the terminal is passed to the auxiliary device
ADF	AUXILIARY DEVICE OFF Data subsequently received by the terminal is not passed to the auxiliary device

2.4.6 Miscellaneous Device Controls

Abbreviation	Name and Definition
EBU	EMPTY BUFFER Causes the contents of the terminal buffer to be transmitted to the line

3.0 CODING STRUCTURE

The coding structure defined allows for both 7- and 8-bit coding of presentation data.

Control functions are coded using primary and supplementary control sets and by using combinations of control codes and following parameters.

Characters are coded in five character-sets.
In the 7-bit environment only one of these character-sets may be invoked into the 'in use' code table.
In the 8-bit environment two of these character-sets may be invoked into the 'in use' code table.
In order to invoke the character-sets, locking shift functions are required for all sets (G0, G1, G2, G3 and L). To enable access to the sets not invoked, single shift functions are also incorporated.

The designation of the sets from a library to the G0, G1, G2 and G3 sets is, in accordance with ISO 2022, the same for both the 8-bit and 7-bit environment.

3.1 Code Extension and Invocation

3.1.1 Common Code Extension Control Functions

Abbreviation	Name and Definition
ESC	ESCAPE A control character that is used to provide additional control functions other than transmission control functions and that alters the meaning of a limited number of contiguously following bit combinations.
CSI	CONTROL SEQUENCE INTRODUCER A control character that is used to provide additional control functions other than transmission control functions and that alters the meaning of a limited number of contiguously following bit combinations.

3.1.2 Invocation Functions (7-bit Environment)

Abbreviation	Name and Definition
SO	SHIFT OUT Invokes the G1 set into columns 2-7 of the code table
SI	SHIFT IN Invokes the G0 set into columns 2-7 of the code table
LS2	LOCKING SHIFT 2 Invokes the G2 set into columns 2-7 of the code table
LS3	LOCKING SHIFT 3 Invokes the G3 set into columns 2-7 of the code table
SS2	SINGLE SHIFT 2 Invokes a single character from the G2 set
SS3	SINGLE SHIFT 3 Invokes a single character from the G3 set

NOTE

L-set activation is by serial C1-controls 5/0 to 5/7

L-set deactivation is by any one of the following:

- serial C1-controls 4/0 to 4/7
- invocation of parallel C1-set
- entering new line
- invocation of a G-set into columns 2 to 7 of the code table

3.1.3 Invocation Functions (8-bit Environment)

Abbreviation	Name and Definition
LS0	LOCKING SHIFT 0 Invokes the G0 set into columns 2-7 of the code table
LS1	LOCKING SHIFT 1 Invokes the G1 set into columns 2-7 of the code table
LS1R	LOCKING SHIFT 1 RIGHT Invokes the G1 set into columns 10-15 of the code table
LS2	LOCKING SHIFT 2 Invokes the G2 set into columns 2-7 of the code table
LS2R	LOCKING SHIFT 2 RIGHT Invokes the G2 set into columns 10-15 of the code table
LS3	LOCKING SHIFT 3 Invokes the G3 set into columns 2-7 of the code table
LS3R	LOCKING SHIFT 3 RIGHT Invokes the G3 set into columns 10-15 of the code table
SS2	SINGLE SHIFT 2 Invokes a single character from the G2 set
SS3	SINGLE SHIFT 3 Invokes a single character from the G3 set

NOTE

L-set activation is by serial C1-controls 5/0 to 5/7

L-set deactivation is by any one of the following:

serial C1-controls 4/0 to 4/7
invocation of parallel C1-set
entering new line
invocation of a G-set into columns 2 to 7 of the code table

3.1.4 Default Code Sets

The primary control function set is designated the C0 set. Either of the supplementary control function sets may be designated as the default C1 set.

The primary set of characters is designated the G0 set. The supplementary set of alphanumeric characters is designated the G2 set.

The first supplementary set of mosaic characters is designated the L set and is invoked by controls in the serial C1 set.

The second supplementary set of mosaic characters is designated the G1 set.

The third supplementary set of mosaic characters is designated the G3 set. In the 8-bit environment the G0 set is invoked into columns 2-7 and the G2 set is invoked into columns 10-14 of the 'in use' code table.

3.2 The Primary Control Function Set - (Table 5)

This set contains two types of elements: those which consist of a single bit combination and those which are used in conjunction with following parameters (RPT and APA).

3.2.1 Parameters For Format Effectors

Repeat RPT (char)

The parameter (char) indicates the number of repetitions of the immediatly preceding graphic character. The representation is in binary form by the 6 least significant bits of the parameter which is taken from columns 4 to 7. The character itself is not included in the count. This function does not apply to control characters.

- Active Position Address APA (char) (char)

A control function with a two or four character parameter. All the characters are within the range 4/0 * to 7/15, and they represent respectively the row address and the column address in binary form, with 6 useful bits (bit 6 being the most significant bit) of the first character to be displayed.

The first character received shall be displayed on the designated character location of the addressed row.

The default address range of the defined display area is 1 to 24 vertically and 1 to 40 horizontally. The location addressed by APA, 4/1, 4/1 (or APA 4/0, 4/1, 4/0, 4/1 if the format exceeds either 63 rows or 63 columns) is the top left-hand location of the defined display area.

If the format exceeds either 63 rows or 63 columns then the relevant parameters, ie the row and the column address, is coded as a two byte sequence with 12 useful bits, the first byte carrying the most significant bits.

* Addressing row 0 is for private use.

TABLE 5 THE PRIMARY CONTROL FUNCTION SET (DEFAULT CO SET)

b4	b3	b2	b1		b7 0	0	0	0	1	1	1	1
					b6 0	0	1	1	0	0	1	1
					b5 0	1	0	1	0	1	0	1
					0	1	2	3	4	5	6	7
0	0	0	0	0	NUL							
0	0	0	1	1		CON						
0	0	1	0	2		RPT						
0	0	1	1	3								
0	1	0	0	4		COF						
0	1	0	1	5								
0	1	1	0	6								
0	1	1	1	7								
1	0	0	0	8	APB	CAN						
1	0	0	1	9	APF	SS2						
1	0	1	0	10	APD							
1	0	1	1	11	APU	ESC						
1	1	0	0	12	CS							
1	1	0	1	13	APR	SS3						
1	1	1	0	14	S0	APH						
1	1	1	1	15	SI	APA[1]						

(1) This code is also used for the Unit Separator (US) control.

(2) Empty positions in the table denote bit combinations reserved for future standardization and shall not be used.

(3) Shaded code positions are reserved for G sets and shall not be used for control characters.

3.3 The Supplementary Control Function Sets

Two supplementary control function sets are defined; one for applying 'serial' attribute controls and one for applying 'parallel' attribute controls.

In the 7-bit environment individual characters of these sets are represented by two-byte combinations of the form ESC, Fe where Fe lies in the range 4/0 to 5/15.

In the 8-bit environment individual characters of these sets are represented by the combinations in the range 8/0 to 9/15.

3.3.1 THE SERIAL SUPPLEMENTARY CONTROL FUNCTION SET - (Table 6)

This set is designated by the sequence ESC 2/2 4/0.

3.3.2 THE PARALLEL SUPPLEMENTARY CONTROL FUNCTION SET - (Table 7)

This set is designated by the sequence ESC 2/2 4/1.

TABLE 6 THE SERIAL SUPPLEMENTARY CONTROL FUNCTION SET

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1
b4 b3 b2 b1	0	1	2	3	4	5	6	7
0 0 0 0 0					ABK	MBK		
0 0 0 1 1					ANR	MSR		
0 0 1 0 2					ANG	MSG		
0 0 1 1 3					ANY	MSY		
0 1 0 0 4					ANB	MSB		
0 1 0 1 5					ANM	MSM		
0 1 1 0 6					ANC	MSC		
0 1 1 1 7					ANW	MSW		
1 0 0 0 8					FSH	CDY		
1 0 0 1 9					STD	SPL		
1 0 1 0 10					EBX	STL		
1 0 1 1 11					SBX	CSI		
1 1 0 0 12					NSZ	BBD		
1 1 0 1 13					DBH	NBD		
1 1 1 0 14					DBW	HMS		
1 1 1 1 15					DBS	RMS		

TABLE 7 THE PARALLEL SUPPLEMENTARY CONTROL FUNCTION SET

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1
	0	1	2	3	4	5	6	7
b4 b3 b2 b1								
0 0 0 0	0				BKF	BKB		
0 0 0 1	1				RDF	RDB		
0 0 1 0	2				GRF	GRB		
0 0 1 1	3				YLF	YLB		
0 1 0 0	4				BLF	BLB		
0 1 0 1	5				MGF	MGB		
0 1 1 0	6				CNF	CNB		
0 1 1 1	7				WHF	WHB		
1 0 0 0	8				FSH	CDY		
1 0 0 1	9				STD	SPL		
1 0 1 0	10				EBX	STL		
1 0 1 1	11				SBX	CSI		
1 1 0 0	12				NSZ	NPO		
1 1 0 1	13				DBH	IPO		
1 1 1 0	14				DBW	TRB		
1 1 1 1	15				DBS	STC		

3.4 The Coding of Graphic Characters

3.4.1 Code Sets

Six code sets are used to encode the graphic characters. These are:

1. The primary set of characters - Table 8
   This consists of the most frequently used alphanumeric characters and punctuation marks. The bit combination 2/0 is used for SPACE and 7/15 is used for DELETE.

2. The supplementary set of alphanumeric characters - Table 9
   This set contains three types of characters:

   - 4/0 to 4/15
     Diacritical marks which are used in combination with the letters of the basic Latin or Greek alphabet in the primary set to constitute the coded representations of characters with diacritical marks. Each of these characters acts as a modifier indicating that the immediately following letter is to be transformed.

   - 6/0 to 7/14
     Alphabetic characters which are used in addition to the basic Latin alphabet in the primary set and which are not composed by combining diacritical marks and basic letters.

   - 2/1 to 3/15 and 5/0 to 5/15
     Non-alphabetic characters which are used in addition to those in the primary set.

3. The first supplementary set of mosaic characters - Table 10
   This set consists of 63 block mosaic characters and 32 text characters, the representation of which is identical to that of the characters of columns 4 and 5 of the primary set of characters.

4. The second supplementary set of mosaic characters - Table 11
   This set consists of 63 block mosaic characters, 28 smoothed mosaic characters, two line vertical bars and one shading character.

5. The third supplementary set of mosaic characters - Table 12
   This set consists of 28 smoothed mosaic characters, 24 line drawing characters and 7 miscellaneous characters.

6. The Greek primary set - Table 13
   This consists of the most frequently used Greek alphanumeric characters and punctuation marks. The bit combination 2/0 is used for SPACE and 7/15 is used for DELETE.

TABLE 8 THE PRIMARY SET OF GRAPHIC CHARACTERS (DEFAULT G0 SET)

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1

b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0				0	@	P	`[2]	p
0	0	0	1	1			!	1	A	Q	a	q
0	0	1	0	2			"	2	B	R	b	r
0	0	1	1	3			#[2]	3	C	S	c	s
0	1	0	0	4			¤[2]	4	D	T	d	t
0	1	0	1	5			%	5	E	U	e	u
0	1	1	0	6			&	6	F	V	f	v
0	1	1	1	7			'	7	G	W	g	w
1	0	0	0	8			(	8	H	X	h	x
1	0	0	1	9			)	9	I	Y	i	y
1	0	1	0	10			*	:	J	Z	j	z
1	0	1	1	11			+	;	K	[2]	k	{[2]
1	1	0	0	12			,	<	L	\[2]	l	|[2]
1	1	0	1	13			−	=	M	][2]	m	}[2]
1	1	1	0	14			.	>	N	^[2]	n	¯[2]
1	1	1	1	15			/	?	O	#/_[1]	o	

(1) The characters allocated to positions 5/15 may be displayed either as _ (LOWER BAR) or # (SQUARE) to represent the terminator function required by existing Videotex services.

(2) The representation of these characters is not guaranteed in international communication and may be replaced by national application oriented variants.

TABLE 9 THE SUPPLEMENTARY SET OF GRAPHIC CHARACTERS (DEFAULT G2 SET)

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1
b4 b3 b2 b1	0	1	2	3	4	5	6	7
0 0 0 0 0				°	∴ 3	—	Ω	K
0 0 0 1 1			¡	±	`	1	Æ	æ
0 0 1 0 2			¢	2	´	®	Đ	đ
0 0 1 1 3			£	3	^	©	a	ð
0 1 0 0 4			$	x	~	™	Ħ	ħ
0 1 0 1 5			¥	µ	¯	♪		ı
0 1 1 0 6			#	¶	˘		IJ	ij
0 1 1 1 7			§	·	¸		Ŀ	ŀ
1 0 0 0 8			¤	+	¨		Ł	ł
1 0 0 1 9			‘	’			Ø	ø
1 0 1 0 10			“	”	°		Œ	œ
1 0 1 1 11			«	»	¸		º	ß
1 1 0 0 12			←	¼		⅛	Þ	þ
1 1 0 1 13			↑	½	˝	⅜	Ŧ	ŧ
1 1 1 0 14			→	¾	˛	⅝	Ŋ	ŋ
1 1 1 1 15			↓	¿	ˇ	⅞	ʼn	

(1) 4/8 is diaeresis and is used for compatibility with other text communication services which may need to distinguish between umlaut and diaeresis.

(2) Empty positions in the table denote bit combinations reserved for future standardization and shall not be used.

(3) The diacritical mark "diaeresis with accent" should only be used with the Greek primary set of graphic characters.

TABLE 10 THE FIRST SUPPLEMENTARY SET OF MOSAIC CHARACTERS (L SET)

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1
b4 b3 b2 b1	0	1	2	3	4	5	6	7
0 0 0 0	0				@	P		
0 0 0 1	1				A	Q		
0 0 1 0	2				B	R		
0 0 1 1	3				C	S		
0 1 0 0	4				D	T		
0 1 0 1	5				E	U		
0 1 1 0	6				F	V		
0 1 1 1	7				G	W		
1 0 0 0	8				H	X		
1 0 0 1	9				I	Y		
1 0 1 0	10				J	Z		
1 0 1 1	11				K	[(2)		
1 1 0 0	12				L	\ (2)		
1 1 0 1	13				M	] (2)		
1 1 1 0	14				N	^ (2)		
1 1 1 1	15				O	# / _ (1)		

(1) The characters allocated to positions 5/15 may be displayed either as _ (LOWER BAR) or # (SQUARE) to represent the terminator function required by existing Videotex services.

(2) The representation of these characters is not guaranteed in international communication and may be replaced by national application oriented variants.

TABLE 11 THE SECOND SUPPLEMENTARY SET OF MOSAIC CHARACTERS (DEFAULT G1 SET)

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1
b4 b3 b2 b1	0	1	2	3	4	5	6	7
0 0 0 0	0							
0 0 0 1	1							
0 0 1 0	2							
0 0 1 1	3							
0 1 0 0	4							
0 1 0 1	5							
0 1 1 0	6							
0 1 1 1	7							
1 0 0 0	8							
1 0 0 1	9							
1 0 1 0	10							
1 0 1 1	11							
1 1 0 0	12							
1 1 0 1	13							
1 1 1 0	14							
1 1 1 1	15							

TABLE 12 THE THIRD SUPPLEMENTARY SET OF MOSAIC CHARACTERS (DEFAULT G3 SET)

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1
b4 b3 b2 b1	0	1	2	3	4	5	6	7
0 0 0 0	0							
0 0 0 1	1							
0 0 1 0	2							
0 0 1 1	3							
0 1 0 0	4							
0 1 0 1	5							
0 1 1 0	6							
0 1 1 1	7							
1 0 0 0	8							
1 0 0 1	9							
1 0 1 0	10							
1 0 1 1	11							
1 1 0 0	12							
1 1 0 1	13							
1 1 1 0	14							
1 1 1 1	15							

(1) Empty positions in the table denote bit combinations reserved for future standardization and shall not be used.

TABLE 13 THE GREEK PRIMARY SET OF GRAPHIC CHARACTERS

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1
b4 b3 b2 b1	0	1	2	3	4	5	6	7
0 0 0 0 0				0	@	Π	[2]	π
0 0 0 1 1			!	1	A	P	α	ρ
0 0 1 0 2			"	2	B	[1]	β	ς
0 0 1 1 3			#	3	Γ	Σ	γ	σ
0 1 0 0 4			¤	4	Δ	T	δ	τ
0 1 0 1 5			%	5	E	Y	ε	υ
0 1 1 0 6			&	6	Z	Φ	ζ	φ
0 1 1 1 7			'	7	H	X	η	χ
1 0 0 0 8			(	8	Θ	Ψ	θ	ψ
1 0 0 1 9			)	9	I	Ω	ι	ω
1 0 1 0 10			*	:	K	[2]	κ	[2]
1 0 1 1 11			+	;	Λ	[	λ	{
1 1 0 0 12			,	<	M	\	μ	|
1 1 0 1 13			-	=	N	]	ν	}
1 1 1 0 14			.	>	Ξ	^	ξ	¯
1 1 1 1 15			/	?	O	_	ο	

(1) Telematic terminals should not transmit this code. However, to ensure compatibility with some conversion equipments, when a telematic terminal receives code 5/2, it shall interpret it as a capital greek letter Sigma.

(2) These code positions are reserved for further standardisation.

3.4.2 The Coding of Characters with Diacritical Marks

Each of these characters is represented by a sequence of two bit-combinations. The first part of this sequence consists of a bit-combination in the range 4/0 to 4/15 from the supplementary set representing a diacritical mark. The second part consists of a bit-combination in the range 4/1 to 5/10 or 6/1 to 7/10 from the primary set representing a basic Latin letter or a bit combination in the range 4/1 to 5/9 or 6/1 to 7/9 from the primary set representing a basic Greek letter or space. The diacritical marks are shown in column 4 of Table 9 and the basic Latin letter are shown in Table 8 and the basic Greek letters are shown in Table 13.

NOTE

If a diacritical mark is used in combination with a basic character such that the resulting character is not within the repertoire the terminal will display the basic character.

3.4.3 Designation of Graphic Sets

ESC	2/8	4/0	Latin Primary set of graphic characters (G0)	to G0
ESC	2/9	4/0	:	to G1
ESC	2/10	4/0	:	to G2
ESC	2/11	4/0	:	to G3
ESC	2/8	6/3	Secondary supplementary set of mosaic characters (G1)	to G0
ESC	2/9	6/3	:	to G1
ESC	2/10	6/3	:	to G2
ESC	2/11	6/3	:	to G3
ESC	2/8	6/2	Supplementary set of graphic characters (G2)	to G0
ESC	2/9	6/2	:	to G1
ESC	2/10	6/2	:	to G2
ESC	2/11	6/2	:	to G3
ESC	2/8	6/4	Third supplementary set of mosaic characters (G3)	to G0
ESC	2/9	6/4	:	to G1
ESC	2/10	6/4	:	to G2
ESC	2/11	6/4	:	to G3

Note: The default position is shown in brackets.

3.4.4 Designation of the Greek Primary Set

ESC	2/8	2/1	4/0	Greek Primary set of graphic characters	to G0
ESC	2/9	2/1	4/0	:	to G1
ESC	2/10	2/1	4/0	:	to G2
ESC	2/11	2/1	4/0	:	to G3

3.5 Supplementary Attribute and Qualified Area Controls

3.5.1 Serial Control STOP CONCEAL

Abbreviation	Name and Coding	
STC	STOP CONCEAL	CSI 4/2

3.5.2 Full Screen and Full Row Attributes

The attributes:

FOREGROUND COLOUR

BACKGROUND COLOUR

LINED

SIZE

FLASH

CONCEAL

INVERT

WINDOW/BOX

are coded as four-character escape sequences of the form:

ESC 2/3 2/0 (Fe) for full screen attributes;

ESC 2/3 2/1 (Fe) for full row attributes;

where Fe is the attribute control character from the parallel C1 set in the 7 bit environment

ie Fe is 4/1 for Red foreground

3.5.3 Marking Controls

Abbreviation	Name and Coding		
MMS	MARKED MODE START		
	Full screen control	CSI 3/0	5/3
	Full row control	CSI 3/1	5/3
	Serial or parallel control	CSI 3/2	5/3
MMT	MARKED MODE STOP		
	Full screen control	CSI 3/0	5/4
	Full row control	CSI 3/1	5/4
	Serial or parallel control	CSI 3/2	5/4

3.5.4 Protecting Controls

Abbreviation	Name and Coding		
PMS	PROTECTED MODE START		
	Full screen control	CSI 3/0	5/0
	Full row control	CSI 3/1	5/0
	Serial or parallel control	CSI 3/2	5/0
PMC	PROTECTED MODE CANCEL		
	Full screen control	CSI 3/0	5/1
	Full row control	CSI 3/1	5/1
	Serial or parallel control	CSI 3/2	5/1
PMI	PROTECTED MODE IDLE		
	Serial or parallel control	CSI 3/2	5/2

The currently invoked C1 set indicates whether the above controls for MARKED and PROTECTED should be interpreted as serial or parallel controls.

3.5.5 Definition of a Scrolling Area

Similar CSI sequences are used for CREATE SCROLLING AREA and DELETE SCROLLING AREA; only the final characters are different.

CSI <URH> <URT> <URU> 3/11 <LRH> <LRT> <LRU> <F>

URH	hundreds value of the upper row
URT	tens value of the upper row
URU	units value of the upper row
LRH	hundreds value of the lower row
LRT	tens value of the lower row
LRU	units value of the lower row

These values are coded from column 3 of the code table. Leading zeros may be omitted.

F : 5/5 for CREATE SCROLLING AREA
5/6 for DELETE SCROLLING AREA

The action of scrolling is initiated as described in sections 2.3.12 and 3.6 of Part 1.

3.5.6 Colour Table Controls

The coding of the colour table invocation controls is as follows:

Abbreviation	Name and Coding	
CT1	COLOUR TABLE 1	CSI 3/0 4/0
CT2	COLOUR TABLE 2	CSI 3/1 4/0
CT3	COLOUR TABLE 3	CSI 3/2 4/0
CT4	COLOUR TABLE 4	CSI 3/3 4/0

3.5.7 Additional FLASH Controls

The additional FLASH controls are coded as follows:

Abbreviation	Name and Coding			
IVF	INVERTED FLASH	CSI	3/0	4/1
RIF	REDUCED INTENSITY FLASH	CSI	3/1	4/1
FF1	FAST FLASH 1	CSI	3/2	4/1
FF2	FAST FLASH 2	CSI	3/3	4/1
FF3	FAST FLASH 3	CSI	3/4	4/1
ICF	INCREMENT FLASH	CSI	3/5	4/1
DCF	DECREMENT FLASH	CSI	3/6	4/1

3.6 Device Controls

3.6.1 Cursor Controls

See primary control function set, Part 1, Section 3.2.

3.6.2 Supplementary Device Controls

Abbreviation	Name and Coding			
RDW	RECORDING DEVICE WAIT	ESC	3/5	
RDS	RECORDING DEVICE START	ESC	3/6	
RDT	RECORDING DEVICE STOP	ESC	3/7	
HCW	HARD COPY WAIT	ESC	3/8	
HCS	HARD COPY START	ESC	3/9	
HCT	HARD COPY STOP	ESC	3/10	
DDO	DISPLAY DEVICE ON	ESC	3/12	
DDF	DISPLAY DEVICE OFF	ESC	3/13	
ADO	AUXILIARY DEVICE ON	ESC	3/14	
ADF	AUXILIARY DEVICE OFF	ESC	3/15	
SCU	SCROLL UP	CSI	3/0	6/0
SCD	SCROLL DOWN	CSI	3/1	6/0
AIS	ACTIVATE IMPLICIT SCROLLING	CSI	3/2	6/0
DIS	DEACTIVATE IMPLICIT SCROLLING	CSI	3/3	6/0
EBU	EMPTY BUFFER	ESC	3/11	

3.7 Designation And Invocation in the 7-Bit Environment (Figure 2)

3.7.1 General

For the 7-bit environment the bases of the coding structure for the Videotex service are the CCITT recommendation V3 (ISO 646), and International Standards ISO 2022 (Rev 79) and ISO 6937.

3.7.2 Coding of Code Extension Control Functions

Abbreviation	Name and Coding	
SI	SHIFT IN	0/15
SO	SHIFT OUT	0/14
LS2	LOCKING SHIFT 2	ESC 6/14
LS3	LOCKING SHIFT 3	ESC 6/15
SS2	SINGLE SHIFT 2	1/9
SS3	SINGLE SHIFT 3	1/13

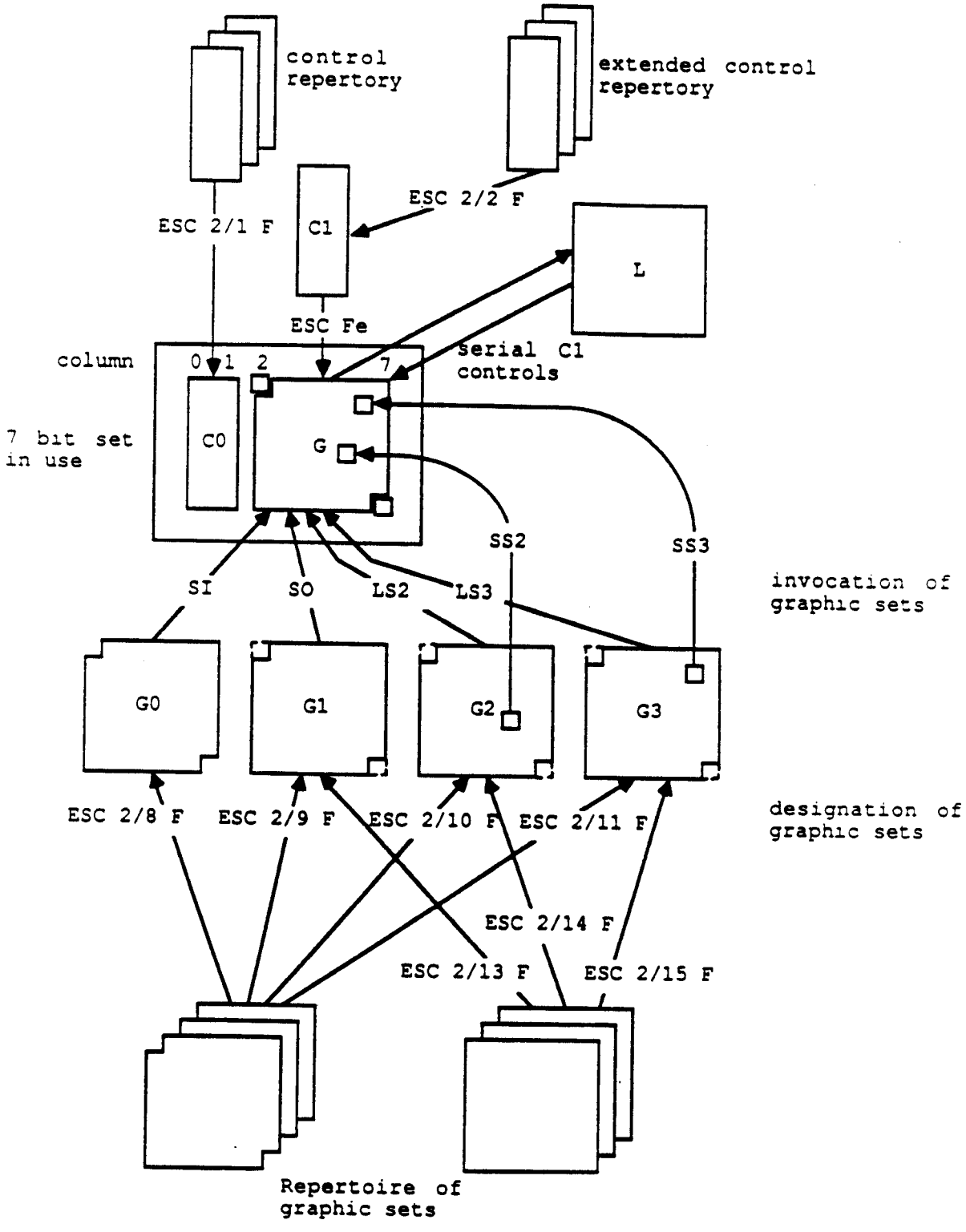


FIGURE 2 CODE EXTENSION IN A 7-BIT ENVIRONMENT

* See section 3.1.2.

3.8 Designation and Invocation in the 8-Bit Environment (Figure 3)

3.8.1 General

The 8-bit code environment preserves the code extension structure of ISO 2022, ie the G0 set is invoked into the left-hand part (positions 2/1 to 7/14) and the G2 set into the right-hand part (positions 10/1 to 15/14) of the code table.

3.8.2 Coding of Code Extension Control Functions

Abbreviation	Name and Coding	
LS0	LOCKING SHIFT 0	0/15
LS1	LOCKING SHIFT 1	0/14
LS1R	LOCKING SHIFT 1 RIGHT	ESC 7/14
LS2	LOCKING SHIFT 2	ESC 6/14
LS2R	LOCKING SHIFT 2 RIGHT	ESC 7/13
LS3	LOCKING SHIFT 3	ESC 6/15
LS3R	LOCKING SHIFT 3 RIGHT	ESC 7/12
SS2	SINGLE SHIFT 2	1/9
SS3	SINGLE SHIFT 3	1/13

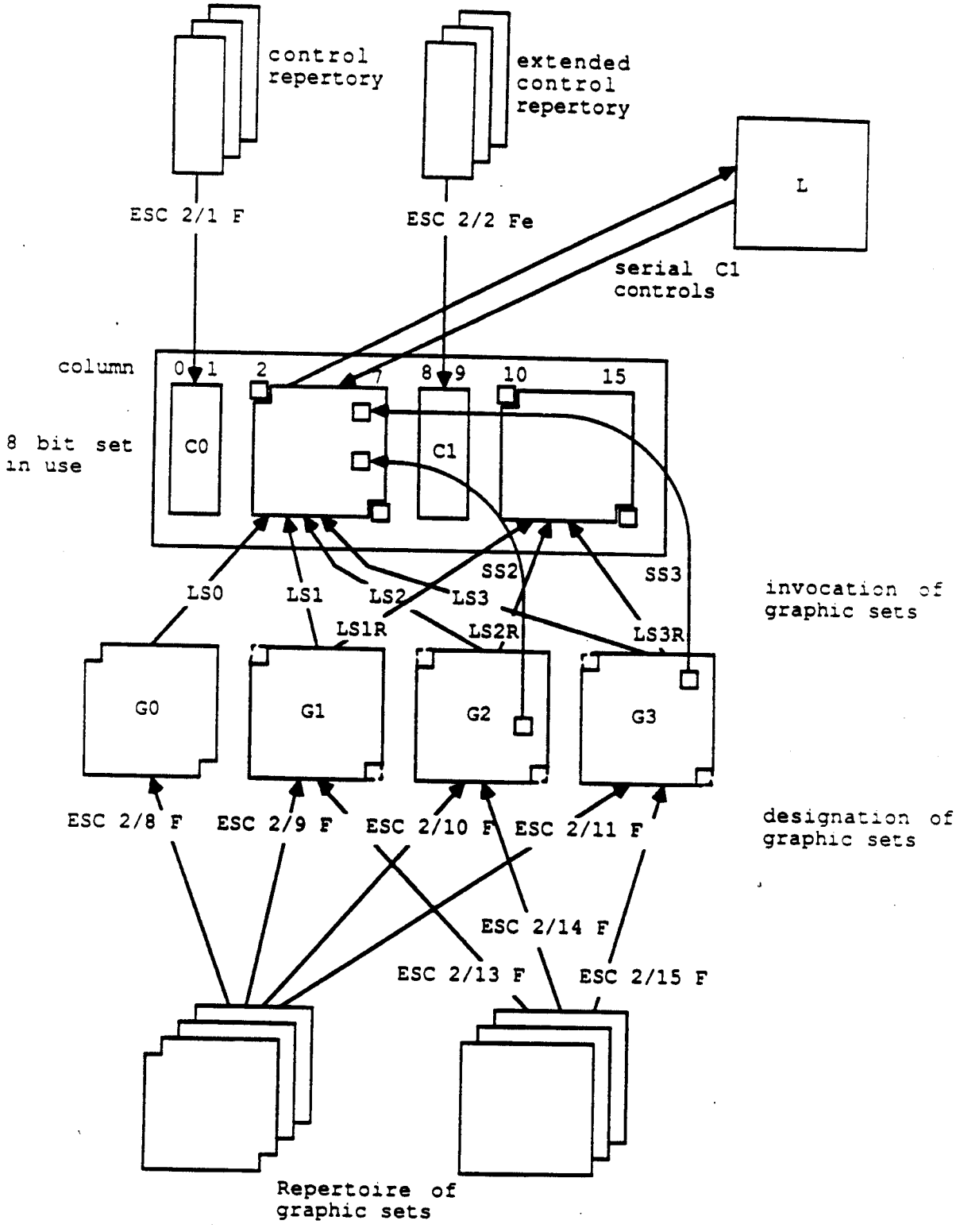


FIGURE 3 CODE EXTENSION IN AN 8-BIT ENVIRONMENT

* See section 3.1.3.

APPENDIX A

IDENTIFICATION SYSTEM

1. For the purpose of this Recommendation, a system has been developed that allows for the identification and description of each graphic character or control function. The system is shown in Table 13.

2. Each identifier consists of two letters and two digits.

3. The first letter indicates the alphabet, the language, etc.

4. The second letter indicates the letter of an alpabet or, in the case of a non-alphabetic graphic character or a control function, the group of characters or control functions.

5. The first digit indicates whether the letter in the second position is modified with a diacritical mark, the position of the diacritical mark, etc. It has no special meaning in the case of the first letter being a C, N or S.

6. The second digit indicates whether the letter is a capital or a small one (even or odd respectively). If the first letter is a C, N or S, this digit being even or odd has no significance.

7. The numbering is used in a consistent manner so that each diacritical mark is always given the same number.

8. The numbering principle is shown in Table 1.

TABLE 14 NUMBERING PRINCIPLE FOR ALPHABETIC CHARACTERS

Item	Small	Capital
No diacritical mark	01	02
Acute accent	11	12
Grave accent	13	14
Circumflex	15	16
Diaeresis or umlaut	17	18
Tilde	19	20
Caron	21	22
Breve	23	24
Double acute accent	25	26
Ring	27	28
Dot	29	30
Macron	31	32
Diaeresis with acute acent	33	-
Cedilla	41	42
Ogonek	43	44
Diphthong or ligature	51	52
Special form	61,63,etc	62,64,etc

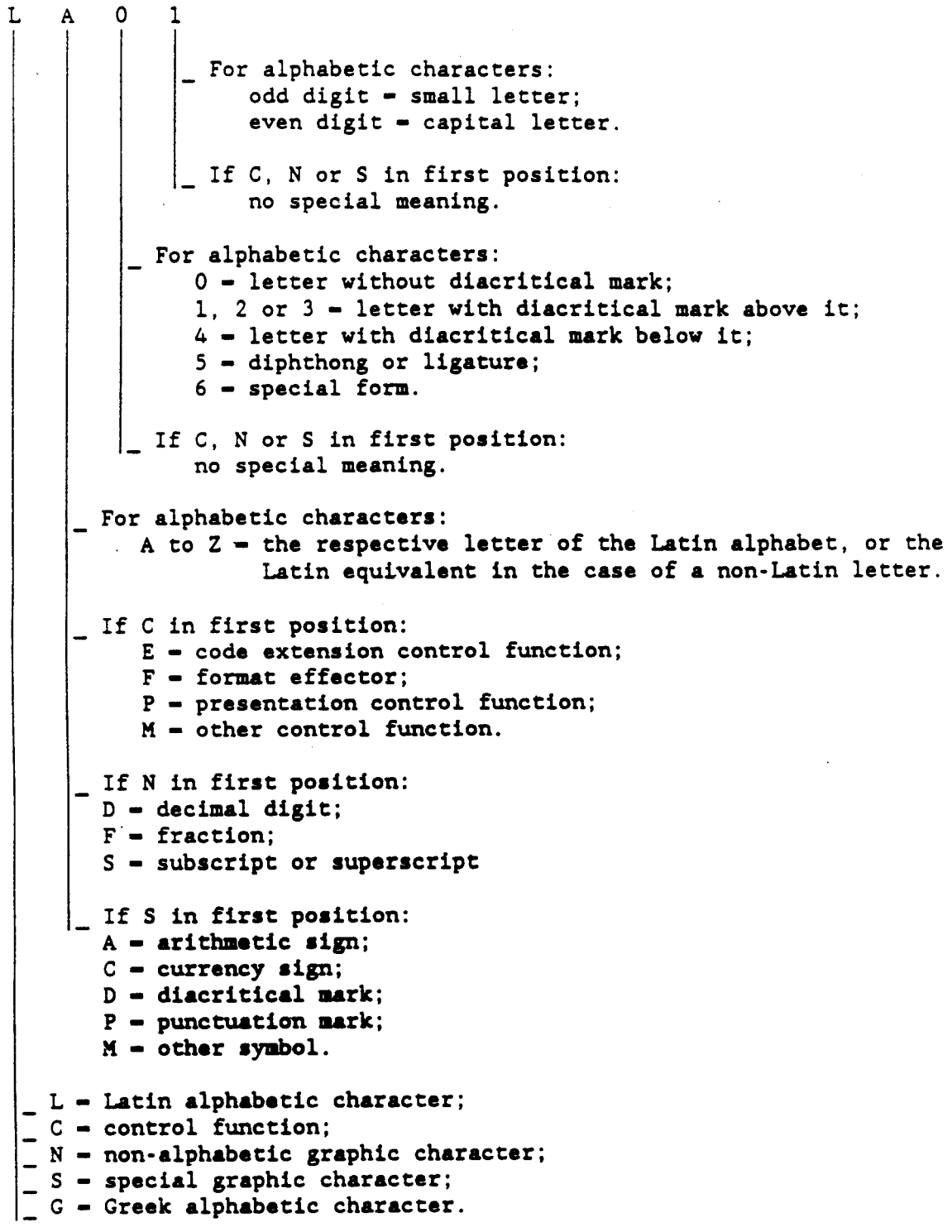


FIGURE 4 IDENTIFICATION SYSTEM

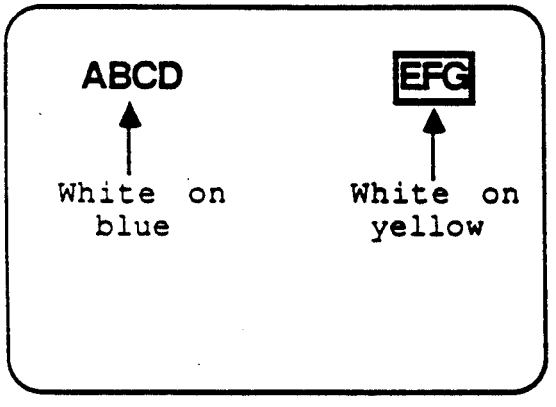
APPENDIX B

EXAMPLES OF TIME DEPENDENCY IN THE UNIFIED ALPHAMOSAIC MODEL

EXAMPLE 1

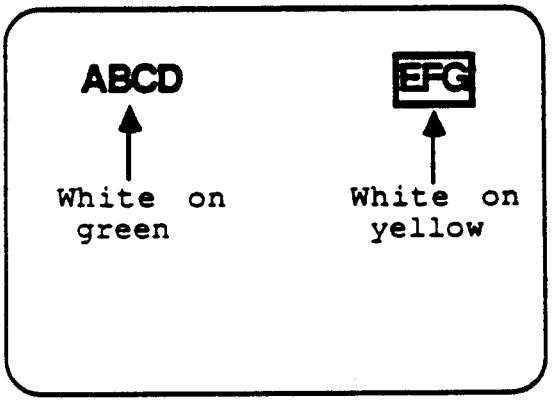
Codes:

Full screen blue



CS, full screen blue background, (transparent background), A, B, C, D, yellow background, E, F, G.

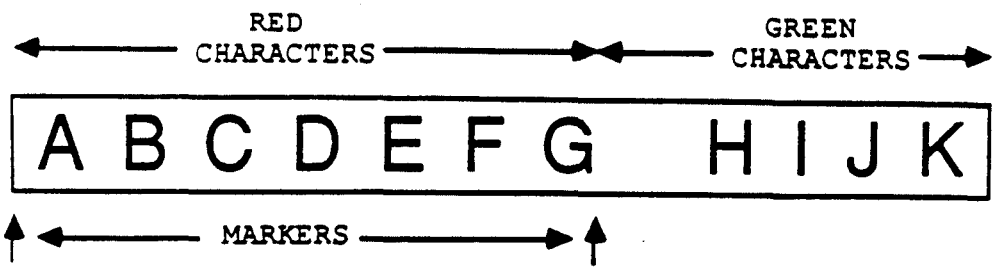
Full screen green



Full screen green background.

EXAMPLE 2

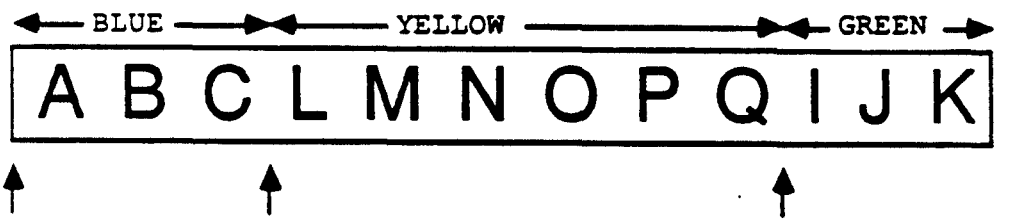
DISPLAY



SEQUENCE OF CODES CS

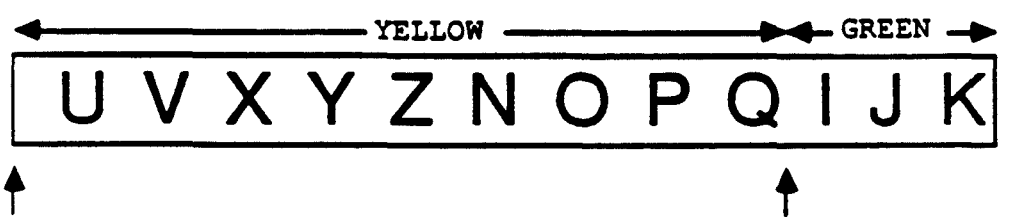
ESC,2/2,Fs
ESC,4/1,APB
A,B,C,D,E,F,G,
ESC,4/2
H,I,J,K

APR
APF,APF,APF
ESC,2/2,Fp
ESC,4/3
L,M,N,O,P,Q



APR
ESC,2/2,Fs
ESC,4/4

APF,
R,S,T



APR
ESC,2/2,Fp
U,V,X,Y,Z

Row attribute set to red foreground

PART 2 GEOMETRIC DISPLAY

Refer to T/TE 06-02

CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

The photographic facility allows for the transmission and display of an image consisting of individually defined picture elements (pixels) with many grey/colour levels. The image may be subjectively similar to a still broadcast quality television picture. Colour television techniques may be used to define the image and digital signal processing techniques may be used to compress the image for storage and transmission.

The protocol allows for many different photographic videotex systems to be specified but recommendations are given based on the CCIR digital television studio standard (Recommendation 601).

A transmission mode allowing all the presentation level bits to be used for photographic data (transparent mode) provides an efficient means of transmitting the relatively large amounts of data needed for photographic images.

1.1 Protocol Principles

The transmission of a photographic image is accomplished using two Videotex Presentation Data Elements (VPDEs). For each VPDE type there are two subtypes; a header and a tranfer unit. Their functions are outlined below.

Pixel header unit - gives the parameters defining the composition of the displayed image and the method of coding used for storage and transmission.

Pixel transfer unit - contains the actual data describing the image (grey/colour levels of each pixel).

Table header unit - specifies the type and format of tables used in in the decoding process (eg set up a quantiser).

Table transfer unit - contains the actual values to be loaded into the tables (eg fill the quantiser).

1.2 Coding/Protocol Definitions

In this part of the recommendation the following definitions apply:

PHOTOGRAPHIC PARAMETER
A photographic parameter is a quantity that conveniently characterises a particular aspect of the transmission or display of the photographic image (eg display resolution).

PARAMETER FIELD
A parameter field is the complete coding specification of a parameter. It consists of a parameter identifier and one or more parameter values.

PARAMETER IDENTIFIER
A parameter identifier introduces a parameter field and defines the particular parameter being specified.

COMPONENT
Certain aspects of the display or transmission may have to split into separate parts, these are referred to as components. (eg colour components Y, U and V).

DELIMITER
A delimiter may be used to separate parameter values or data for different components.

1.3 Coding Principles

The coding scheme provides for unambiguous identification of videotex control codes (columns 0, 1), photovideotex parameters (columns 2, 3) and allows 6 bits (columns 4, 5, 6, 7) to be used for data. A diagram of the code table is shown in Figure 1.

Column 2 - indentifies the parameter being specified, see Figure 2

Column 3 - is used to specify
- a value in decimal form
- to give a 'type number'
- to separate parameters/data for different components.

Codes 3/0 to 3/9 represent decimal values 0 to 9.

3/11 is used to delimit decimal values. Leading zeroes may be omitted.

3/12 may be used if desired within a parameter to separate different components.

If a default value exists for a parameter it is assigned the 3/0 type value.

When a parameter has several components the values for each component are specified in sequence. If the value of a trailing component(s) is(are) the same as the previous values then it(they) may be omitted. If a whole parameter is omitted then it is assumed
- that its value is implicit from other information,
- it is a default value or
- the parameter is not applicable in this particular case.

Data may be coded using columns 4, 5, 6 and 7 of the code table. The protocol also allows for all code bits received at the presentation level to be used for data (transparency).

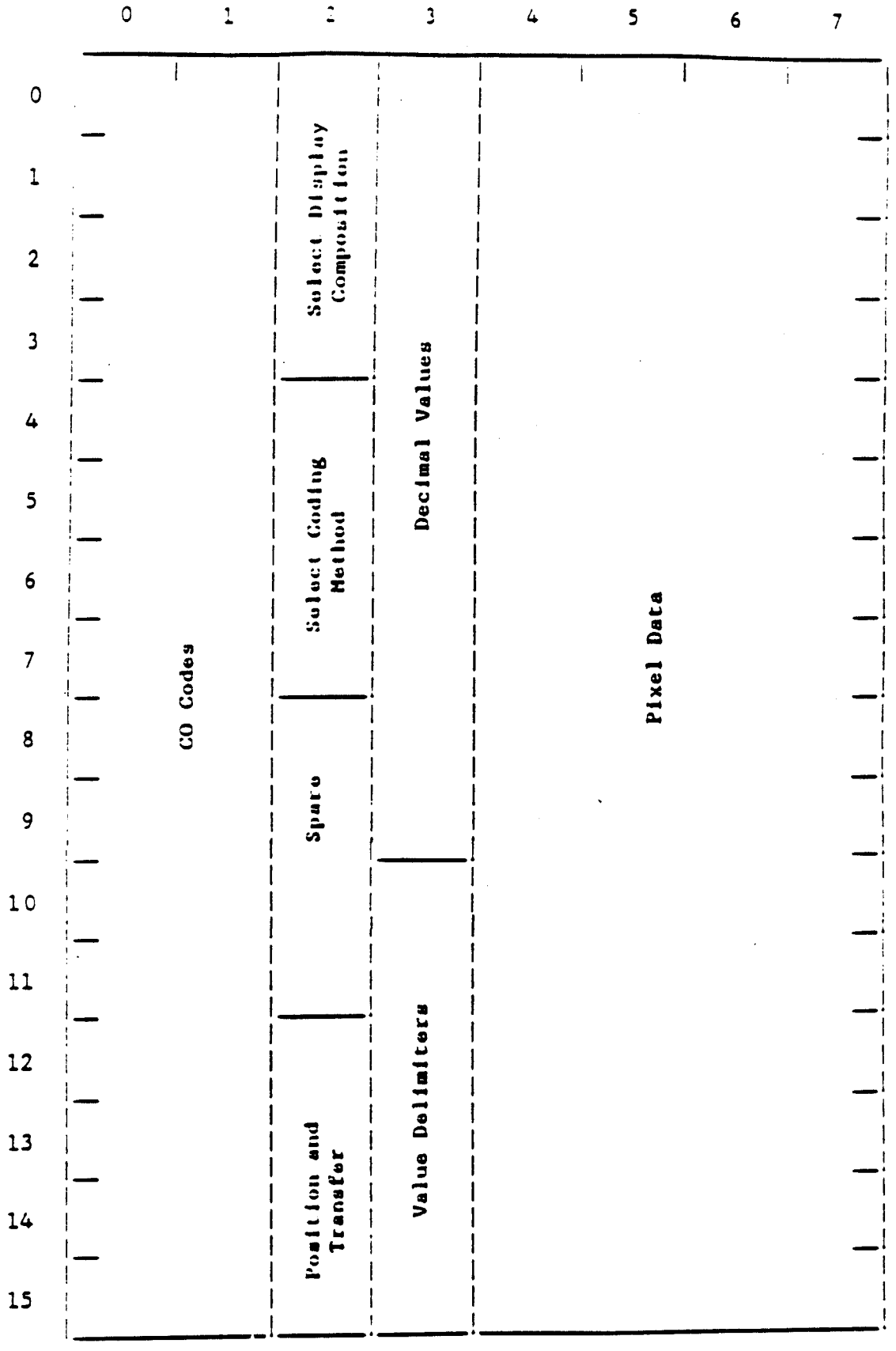


FIGURE 1 PHOTOVIDEOTEX CODE TABLE

	PARAMETER CODE		DEFAULT
SELECT DISPLAY COMPOSITION	2/0	Components	(Y, U*, V*)
	2/1	Resolution	(4:2:2)
	2/2	Bits/Pixel/Component	(8/8/8)
	2/3	Sampling Structure	(Orthogonal Coincident)
SELECT CODING METHOD	2/4	Image Coding	(Linear PCM)
PIXEL TRANSFER	2/12	Origin	(Top Left of Defined Display Area)
	2/13	Area	(Defined Display Area)
VALUES	3/0	0	
	3/1	1	
	3/2	2	
	3/3	3	
	3/4	4	
	3/5	5	
	3/6	6	
	3/7	7	
	3/8	8	
	3/9	9	
DELIMITERS	3/11	Decimal Delimeter	
	3/12	Component Delimeter	

FIGURE 2 PIXEL PARAMETER CODES AND DEFAULTS

* CCIR colour difference signals.

2.0 PHOTOGRAPHIC PIXEL HEADER UNIT

The header unit will take the form

US 3/4 2/0 <SDC> <SCM>

The definitions of parameter fields above are given below. The header applies for all following pixel transfer units until another header is sent or until the end of the session.

2.1 <SDC> : Select Display Composition

This field specifies the composition of the photographic display. It can contain up to 4 parameters.

<SDC> : <COM> <RES> <BPC> <STR>

2.1.1 <COM> : Display Components

A displayed image may be formed from one or more components. For a monochrome image only one component is needed but colour requires three. Sets of different component possibilities are given in the table below and a code is assigned to each.

<COM> = display component identifier, component type number

= 2/0 3/C

3/C = 3/0 colour YU*V*
3/1 monochrome

:
: (for later
3/15 (allocation

2.1.1.1 CCIR Monochrome And Colour Component

A colour image is defined as being comprised of a luminance (brightness) and a pair of colour difference (colouring) components. A monochrome image contains the luminance (brightness) component only.

The luminance signal is obtained from gamma-corrected primary signals, R,G,B and corresponds to the equation

$$Y = 0.299R + 0.587G + 0.114B$$

* CCIR colour difference signals.

The colour-difference signal components are then defined as:

R-Y = 0.701R - 0.587G - 0.114B

B-Y = -0.299R - 0.587G + 0.886B

The colour-difference signals have a range of 0.701 to -0.701 for R-Y, and 0.886 to -0.886 for B-Y. To restore the signal excursion of the colour-difference signals to unity (i.e. +0.5 to -0.5), coefficients are applied to the R-Y and B-Y. The weighted colour-difference signals U* and V* are then defined as

U* = 0.564(B-Y)

V* = 0.713(R-Y)

2.1.2 <RES> : Display Resolution

Display resolution is defined as the number of pixels horizontally and vertically in the defined area.

The CCIR recommendation 601 specifies for the digital television studio standard a 13.5 MHz luminance sampling frequency and a 6.75 MHz chrominance sampling frequency for 625 and 525 line systems. The actual number of pixels is dependent on the size of the area. For this existing standard and for other systems based on it a shorter coding can be used to specify the horizontal and vertical resolution. The CCIR nomenclature for sampling frequencies is used where the frequencies of the three components are expressed in sequence and relative to 3.375MHz (eg 13.5 / 6.75 / 6.75 MHz = 4:2:2).

<RES> = resolution ident, resolution type number

= 2/1 3/R

3/R = 3/0 4:2:2 (CCIR studio standard)
3/1 2:1:1

: (for later allocation)
3/15 Decimally defined value - see below

2.1.2.1 Decimally Defined Resolution

Other resolutions may be specified if required by specifying in decimal form the number of pixels horizontally and vertically. If the pixel is formed from more than one component the resolution of each component is specified in sequence in descending order of resolution. The highest resolution component is referred to as the first component. The resolution of the other lower resolution components are specified as a fraction of the resolution of the first component and are coded as the reciprocal of the fraction (eg 1/4 is specified as 4).

<RES> = resolution ident, no of horiz pixels, no of vert pixels

= 2/1 3/15 ...3/uHa 3/11 ...3/uVa 3/11 (1st component)
...
:
...3/uHn 3/11 ...3/uVn 3/11 (nth component)

2.1.3 <BPC> : Bits per Display Component

This parameter gives the number of grey or colour levels a pixel may have. The number of levels available for each component is expressed in terms of the number of bits of storage per pixel per component if stored in an uncompressed PCM form. Normally this will be a value in the range 1 to 9 and can be specified by a single code value.

<BPC> = bits/pixel/comp ident, no of bits/pixel/component

= 2/2 ...3/Ba 3/11 (1st component)
...
:
...3/Bn 3/11 (nth component)

where: 3/B = 3/0 8 bits/pixel (default)
3/1 1 bit/pixel
3/2 2 bits/pixel
:
:
3/9 9 bits/pixel

3/15 Decimally defined value - see below

2.1.3.1 Decimally Defined Bits per Display Component

The number of bits per component may if necessary be specified in full decimal form.

<BPC> = bits/pixel/comp ident, no of bits/pixel/component (in decimal form)

= 2/2 3/15 ...3/uBa 3/11 (1st component)
...
:
...3/uBn 3/11 (nth component)

2.1.3.2 CCIR Level Assignment

The CCIR recommendation defines certain reference binary levels for a uniformly quantised pcm image having 8 bits per sample. Luminance samples are represented by a positive binary number and colour difference samples by a offset binary number. The total nominal excursion of the luminance signal corresponds to 220 quantisation levels, with black corresponding to level 16, and nominal white to level 235 (Figure 3). There is an unequal quantisation margin above and below the nominal signal, because there is a greater variation in the nominal white level than in the nominal black level and the effect of clipping the overshoot will be more preceptible in the white region.

Given that the luminance signal is to occupy 220 levels and that black is to be at level 16, the digital luminance signal Yd may be calculated by

Yd = 219Y + 16

Y is the luminance analogue signal of any colour, expressed as a fraction of unity.

Yd is the corresponding level number after quantisation to the nearest integer value.

The colour-difference signals each occupy 225 levels in the central part of the quantisation scale, with zero signal corresponding to level 128 (Figure 3).

LEVEL		BINARY	HEX
255	----------	(11111111)	FF
235	------ White -------	(11101011)	EB
16	------ Black -------	(00010000)	10
0	----------	(00000000)	0

LUMINANCE CODING RANGE

LEVEL		BINARY	HEX
255	----------	(11111111)	FF
240	------ Maximum ------	(11110000)	F0
128	------- Zero --------	(10000000)	80
16	------ Minimum ------	(00010000)	10
0	----------	(00000000)	0

COLOUR DIFFERENCE CODING RANGE

FIGURE 3 LEVEL ASSIGNMENT

Given that the colour-difference signals are to occupy 225 levels and that zero level is to be 128, the decimal values of the colour-difference signals, V*, U* may be calculated

$$V^*d = 224[0.713(R-Y)]+128$$

$$U^*d = 224[0.564(B-Y)]+128$$

V*d U*d are the corresponding level numbers after quantisation to the nearest integer value.

R-Y, B-Y are the colour-difference analogue values of any colour expressed as a fraction of unity.

2.1.4 <STR> : Sampling Structure

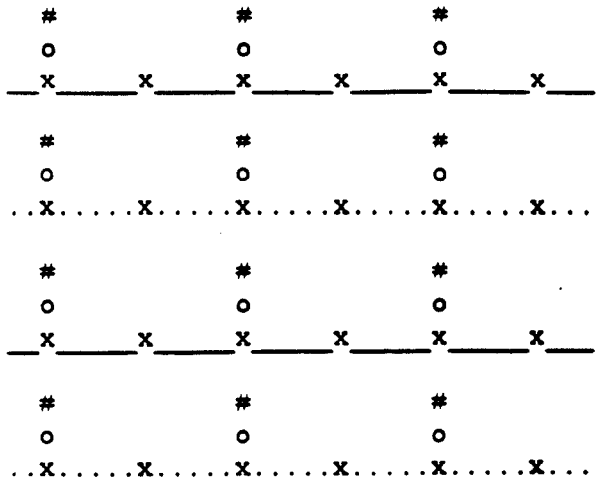
The structure parameter defines the spatial and temporal relationship between pixels on adjacent lines and fields, see Figure 4 (Sampling Structures). The relationship between samples of the first component is specified first followed by the relative structure of the other components to the first.

<STR> = structure ident, structure type number(s)

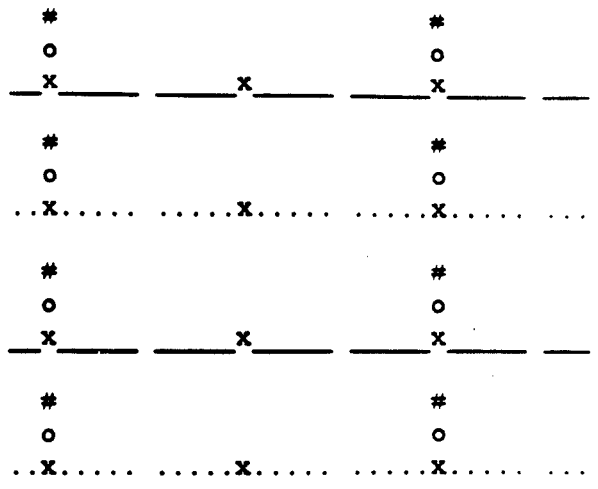
= 2/3 3/S 3/R

3/S = 3/0 line orthogonal field orthogonal) interlaced
3/1 line orthogonal field quincunx)
3/2 line quincunx field orthogonal)
3/3 line orthogonal single field
3/4 line quincunx single field
:
: (for later
3/15 (allocation

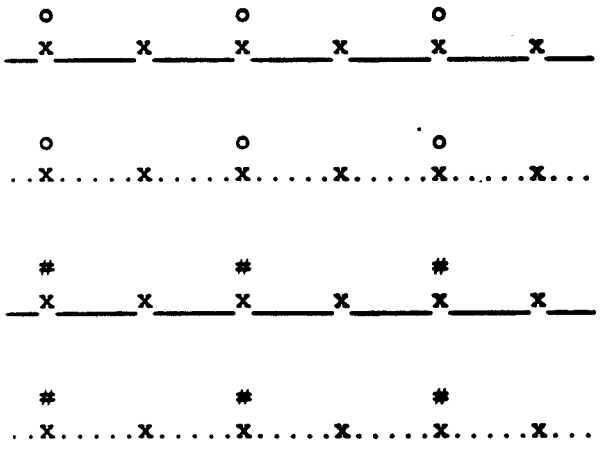
3/R = 3/0 coincident
3/1 alternate samples
3/2 sequential line
:
: (for later
3/15 (allocation



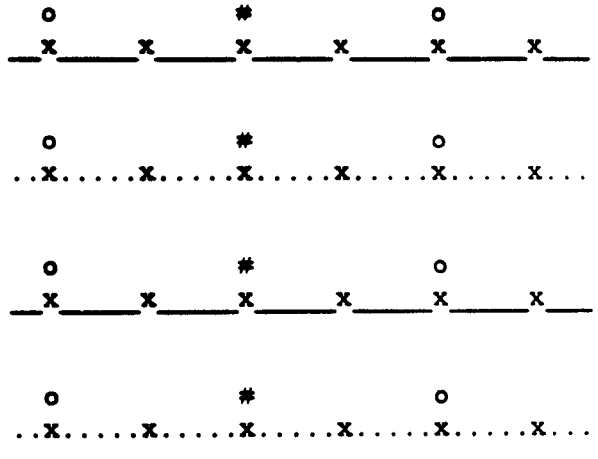
Field Orthogonal and Line Orthogonal Coincident Samples (CCIR mode 4.2.2)



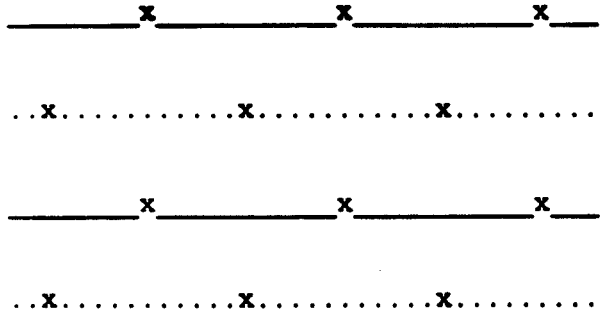
Field Orthogonal and Line Orthogonal Coincident Samples (CCIR mode 2.1.1)



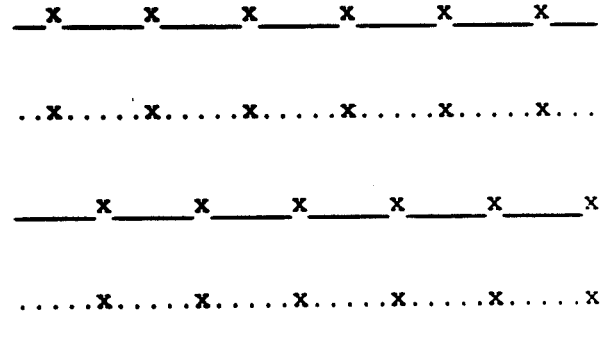
Field Orthogonal and Line Orthogonal Sequential Samples



Field Orthogonal and Line Orthogonal Alternate Samples



Field Quincunx and Line Orthogonal Coincident Samples



Field Orthogonal and Line Quincunx Coincident Samples

x 1st component Y
o 2nd component U
\# 3rd component V

____ Field 1
..... Field 2

FIGURE 4 SAMPLING STRUCTURES

2.2 <SCM> : Select Coding Method

The way in which data is coded for storage and/or transmission is described in this section. At present only one parameter field is specifiable, other parameters are given in the descriptions of particular coding techniques. Later when other generally useful parameters have been identified these may be made individually specifiable.

<SCM> : <ICT>

2.2.1 <ICT> : Image Coding Techniques

A photographic image is normally encoded using digital signal processing techniques (eg pulse code modulation or a mathematical tranform). The various methods offer advantages such as high compression, a desirable image build-up, good quality, or be suitable for a certain type of image. A table of image coding techniques is given and a code is assigned to each. A subtype may be used to distinguish between different techniques of the same type. Each technique may have an independent set of subtypes specified in a list.

<ICT> = coding ident, coding type no

= 2/4 <TY> <STY> <SSTY>

<TY> : Type		<STY> : Subtype		<SSTY> : Subsubtype
3/1	dpcm	3/0	one dimensional (Appendix A)	
3/2	transform	3/1	Cosine	3/0 two dimensional (Appendix B)
:				
3/15	{ for future allocation			

The details of the recommended coding methods are given in the appendices. A particular coding technique may implicitly specify certain parameters such as the number of bits per sample or the sequence for transmission.

3.0 PHOTOGRAPHIC PIXEL TRANSFER UNIT

This VPDE carries the data defining the grey/colour level of the pixels forming the photographic image and specifies where the image is to be located on the display. It takes the form

US 3/4 <ORG> <ARE> <DAT>

3.1 <ORG> : Origin

The origin is the first pixel position to which the data following will refer. This is the top left corner of the rectangular area as defined below. It is specified in terms of the horizontal and vertical pixel position of the first component with respect to the Defined Display Area. (see 2.1.2). See Figure 5 for Full Screen, Origin and Defined Display Area relationships.

<ORG> = origin ident, horiz pix pos, vert pix pos

= 2/12 ...3/uX 3/11 ...3/uY 3/11

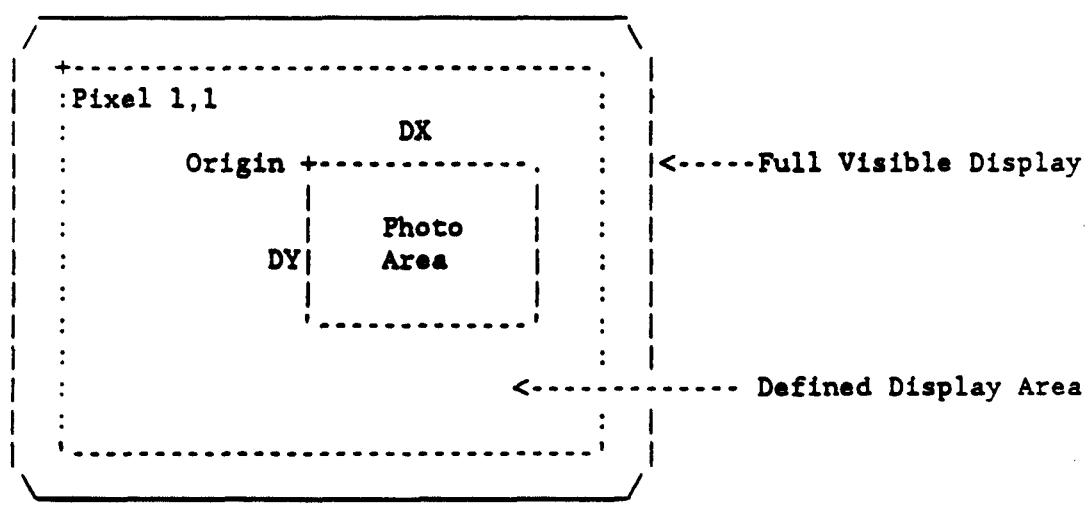


FIGURE 5 DISPLAY AREAS

3.2 <ARE> : Area

This defines a rectangular area to be filled by the photographic data following. The width and height of the area are specified in terms of the number of pixels of the first component. A non-rectangular image can be constructed from small rectangles, if desired of only one line's height. Alternatively a mask of the required shape may be created on an outer layer.

<ARE> = area ident, area width, area height

= 2/13 ...3/uAW 3/11 ...3/uAD 3/11

When an area has been completely filled by all components the origin is assumed to be set back to the origin of the area.

Other methods of defining the area to be filled by the image are for further study.

3.3 <DAT> : Pixel Data

3.3.1 Within The Code Table

Following the introduction variables described above any codes from columns 4, 5, 6 or 7 will be automatically interpreted as data, the least significant 6 bits of each code being considered as a continuous bit stream containing concatenated data values.

<DAT> = 4/H 5/H 6/H 7/H ...

3.3.2 Transparent Data

As photographic images contain a relatively large amount of data it is desirable for increased efficiency to use all the presentation level code bits for actual data (8 bits per character). In such a mode all codes pass uninterrupted by the normal presentation level control codes and the mode is thus termed transparent.

The transparent mode is entered using the TRANSPARENT data VPDE (see Part 7).

4.0 PHOTOGRAPHIC TABLE HEADER UNIT

For certain photovideotex schemes various tables are needed in the decoding process whose contents have to be changed for different images. The table header unit allows for a set of tables to be specified. Figure 6 shows examples of table structures.

The header unit will take the form:

US 3/5 2/0 <SET> <SIZ>

4.1 <SET> : Table Set

The use to which this table is put is defined within a particular coding technique description. The parameter field specifies the table type identity number and the number of tables of that type required. The parameter field is defined within the particular coding technique.

<SET> - set ident, table type no, no of tables

- 2/1 ...3u/T 3/11 ...3/uN 3/11

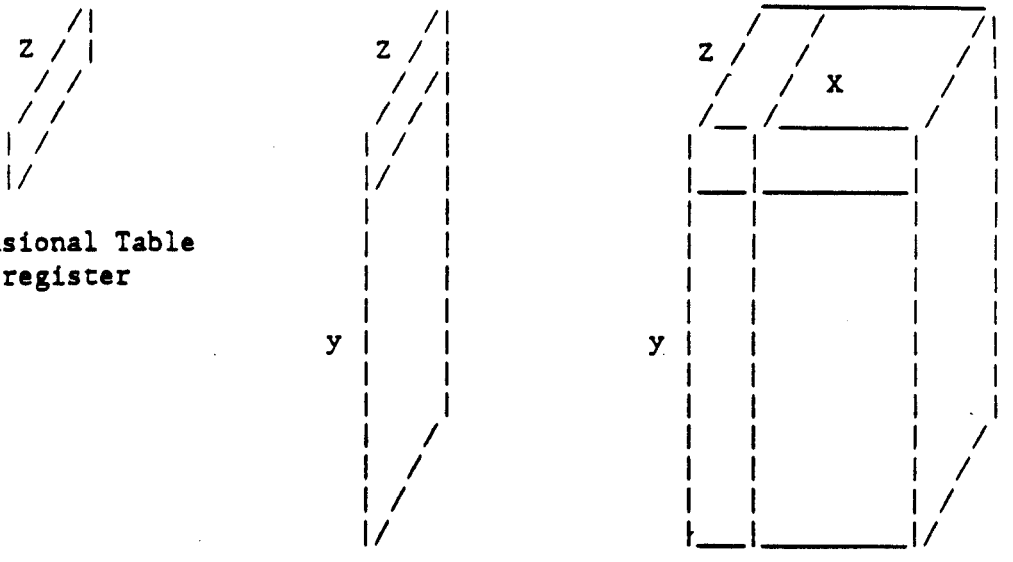


FIGURE 6 PARAMETER TABLE STRUCTURE

4.2 <SIZ> : Table Size

A generalised table is defined in three dimensionsal form. If a table has only two dimensions (eg a quantiser) the third dimension is omitted.

<SIZ> = table size ident, table depth (Z), height (Y), width (X)

= 2/2 ...3/uZ 3/11 ...3/uY 3/11 ...3/uX 3/11

5.0 PHOTOGRAPHIC TABLE TRANSFER UNIT

A table transfer unit is used to fill a previously defined table(s).

US 3/5 <ID> <LOC> <DAT>

5.1 <ID> : Identity

A particular set of tables is identified using its table set type number and table number within the set. Where there are a number of tables of a given type they will be filled in sequence. If only one value is given it is assumed to be the first table of the set that is addressed.

<ID> = table identification ident, set type no, table no

= 2/1 ...3/uT 3/11 ...3/uN 3/11

5.2 <LOC> : Location

A particular location or bit within a table may be addressed by using its XYZ coordinates as used for the table dimensions. See Figure 7

<LOC> = location ident, XYZ address

= 2/2 ...3/uX 3/11 ...3/uY 3/11 ...3/uZ 3/11

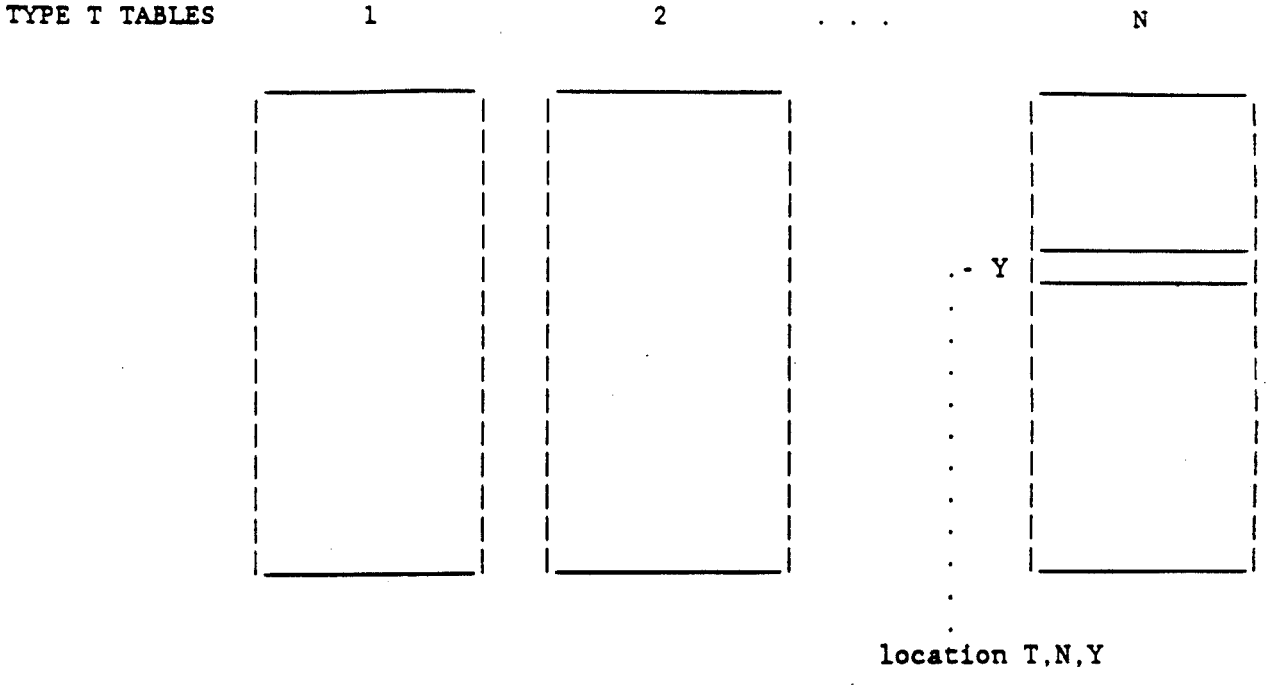


FIGURE 7 PARAMETER TABLE ADDRESSING

5.3 <DAT> : Data

5.3.1 Within The Code Table

Table data is coded using the 6 least significant bits of codes from columns 4,5,6,and 7.

<DAT> = 4/H 5/H 6/H 7/H ...

5.3.2 Transparent Data

A table may be filled using a transparent mode as described in section 3.3.2.

APPENDIX A

DPCM IMAGE CODING - ONE DIMENSIONAL

A.1 INTRODUCTION

Differential pulse code modulation (DPCM) is a digital signal coding technique in which the differences between adjacent digitally encoded sample values are used for storage and/or transmission. DPCM is also referred to as predictive coding since the difference between the present value and a predicted value may be used.

A coding scheme may be derived using a difference value based on a one dimensional or two dimensional prediction. The quantiser relating difference codes to actual value changes may be fixed or adaptive (ie changed according to image characteristics).

A.2 ONE DIMENSIONAL - PREVIOUS ELEMENT PREDICTION DPCM

A.2.1 General

This scheme provides for 50% data compression. It is relatively simple to decode, allowing for cheap and/or high speed decoding. The image is built up pixel by pixel, line by line in two scans. The first scan fills the whole area with a monochrome picture which is then coloured in the second scan.

A.2.2 Compression Technique

The pixel colour information is described using the television signal components luminance (Y) and chrominance (U and V). The prediction for the next sample value (Pn+1) is that it will be the same as the present value on the same TV line. The prediction is reset at the start of each line to a mid-range value. For luminance and chrominance this is the value 128 (decimal). The difference or error (D) between the prediction (P) and the actual value (V) is coded and used for storage and/or transmission.

$$\text{Transmitted value } D_{n+1} = V_{n+1} - P_{n+1} = V_{n+1} - V_n$$

Data compression is achieved by using a non-uniform quantiser. A 16 level quantiser is used and so 4 bits/sample are transmitted. The scheme is non-adaptive and thus the quantiser is fixed as shown below. The same quantiser is used for luminance and both chrominance signals.

The value for display is reconstructed by adding the difference/error to the prediction:

Display value $V_{n+1} = P_{n+1} + D_{n+1} = V_n + D_{n+1}$

INPUT DIFFERENCE	TRANSMITTED CODE	OUTPUT DIFFERENCE (D_{n+1})
0-2	0	1
3-6	1	4
7-12	2	9
13-21	3	16
22-35	4	27
36-61	5	44
62-99	6	79
100-255	7	120
----------	----------	----------
-(1-2)	8	-1
-(3-6)	9	-4
-(7-12)	10	-9
-(13-21)	11	-16
-(22-35)	12	-27
-(36-61)	13	-44
-(62-99)	14	-79
-(100-255)	15	-120

A.2.3 Transmission Sequence

The luminance values for the area are transmitted first. Each byte contains two samples. Starting at the origin, values are sent in sequence pixel by pixel, line by line. When the area has been filled by one component the next pixel position is reset to the origin of the area. The chrominance values are sent in UV pairs in sequence pixel by pixel, line by line. Again two samples are sent per byte.

Y11 Y12	Y1N
Y21 Y22	Y2N
:	:
YM1 YM2	YMN
UV11 UV13	UV1N/2
UV21 UV23	UV1N/2
:	:
UVM1 UVM3	UVMN/2

A.3 EXAMPLE OF CODING FOR DPCM

Photographic Data Header Unit

This will normally only be sent once at the start of a photovideotex session.

```
VPCE : US  3/4  2/0      (photographic data header unit)

VSCE : 2/1   3/1         (display resolution = 2:1:1)
       2/3   3/3         (structure = line orthogonal single field)
       2/4   3/1  3/0    (coding technique = DPCM - one dimensional)

       Defaults not transmitedd - components      = Y,U*,V*
                                  bits /component = 8/8/8
```

Photographic Data Transfer Unit

This unit is sent for each photovideotex image.

```
VPCE : US  3/4                    (photographic data transfer unit)

PDSU : 2/12  3/hX  3/tX  3/uX  3/11  3/hY  3/tY  3/uY  3/11
     not 2/0                      (origin pixel location = htuX  htuY)

     : 2/13  3/hW  3/tW  3/uW  3/11  3/hH  3/tH  3/uH  3/11
                                  (area width and height = htuW x htuH)

       US  3/15  N  Y  Y  Y  Y  ...  (transparent data for N bytes)
                                  luminance data
        :
        :
        :
       US  3/15  N  Y  Y  Y  Y  ...

       US  3/15  N  U*  V*  U*  V*  ...
                                  chrominance data
        :
        :
        :
       US  3/15  N  U*  V*  U*  V*  ...
```

APPENDIX B

DCT IMAGE CODING - TWO DIMENSIONAL

B.1 INTRODUCTION

The main steps for image coding and decoding on a transform basis are shown in Figure B.1.

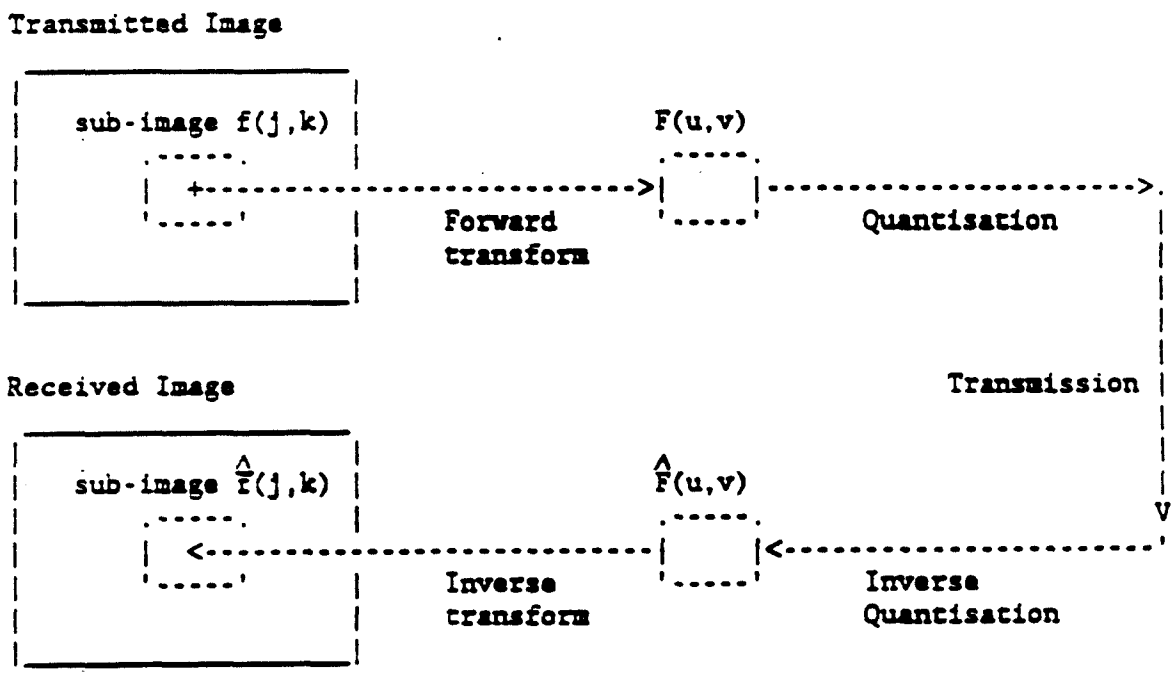


FIGURE B-1 TRANSFORM CODING AND DECODING

The principle characteristics of image coding by transform methods are:

By using an orthogonal transform such as the Discrete Cosine Transform high energy compaction is achieved;

Adaptivity due to sorting the transform sub-images of an image into classes by the level of image activity present;

Averaging of channel noise over the whole sub-image.

The Discrete Cosine Transform (DCT) is a coding method belonging to the general class of discrete orthogonal transforms.

The typical performance obtained with DCT is:

1. 0.5 - 1 bit per pixel for monochrome images
2. 1 - 2 bits per pixel for colour images

B.2 THE DISCRETE COSINE TRANSFORM

B.2.1 General

The two-dimensional Cosine Transform of a discrete function

f(j,k) j, k = 0, 1, ..., N-1 is defined as:

$$F(u,v) = \frac{4C(u).C(v)}{N^2} \sum_{j=0}^{N-1} \sum_{k=0}^{N-1} f(j,k). \cos\left[\frac{(2j+1)\pi.u}{2N}\right]. \cos\left[\frac{(2k+1)\pi.v}{2N}\right]$$

where u, v = 0, 1, ..., N-1

The inverse transform is:

$$f(j,k) = \sum_{u=0}^{N-1} \sum_{v=0}^{N-1} C(u).C(v)\ F(u,v). \cos\left[\frac{(2j+1)\pi.u}{2N}\right]. \cos\left[\frac{(2k+1)\pi.v}{2N}\right]$$

where $C(0) = \frac{1}{\sqrt{2}}$

C(u) = C(v) = 1 for u, v = 1, 2, ..., N-1
C(u) = C(v) = 0 elsewhere

Block diagrams of a DCT adaptive coding system are shown in Figures B-2 and B-3.

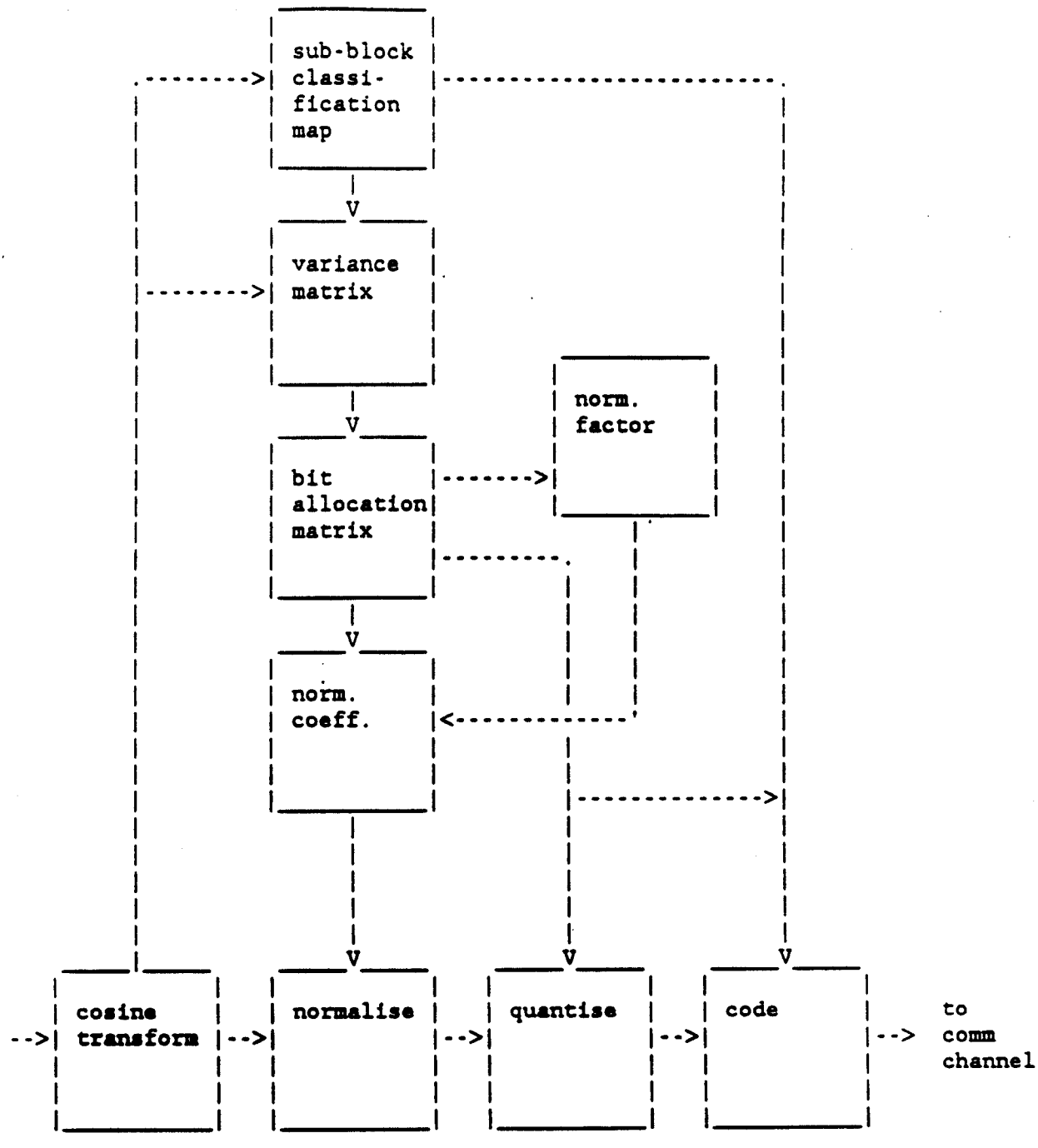


FIGURE B-2 COSINE TRANSFORM ADAPTIVE CODING SYSTEM

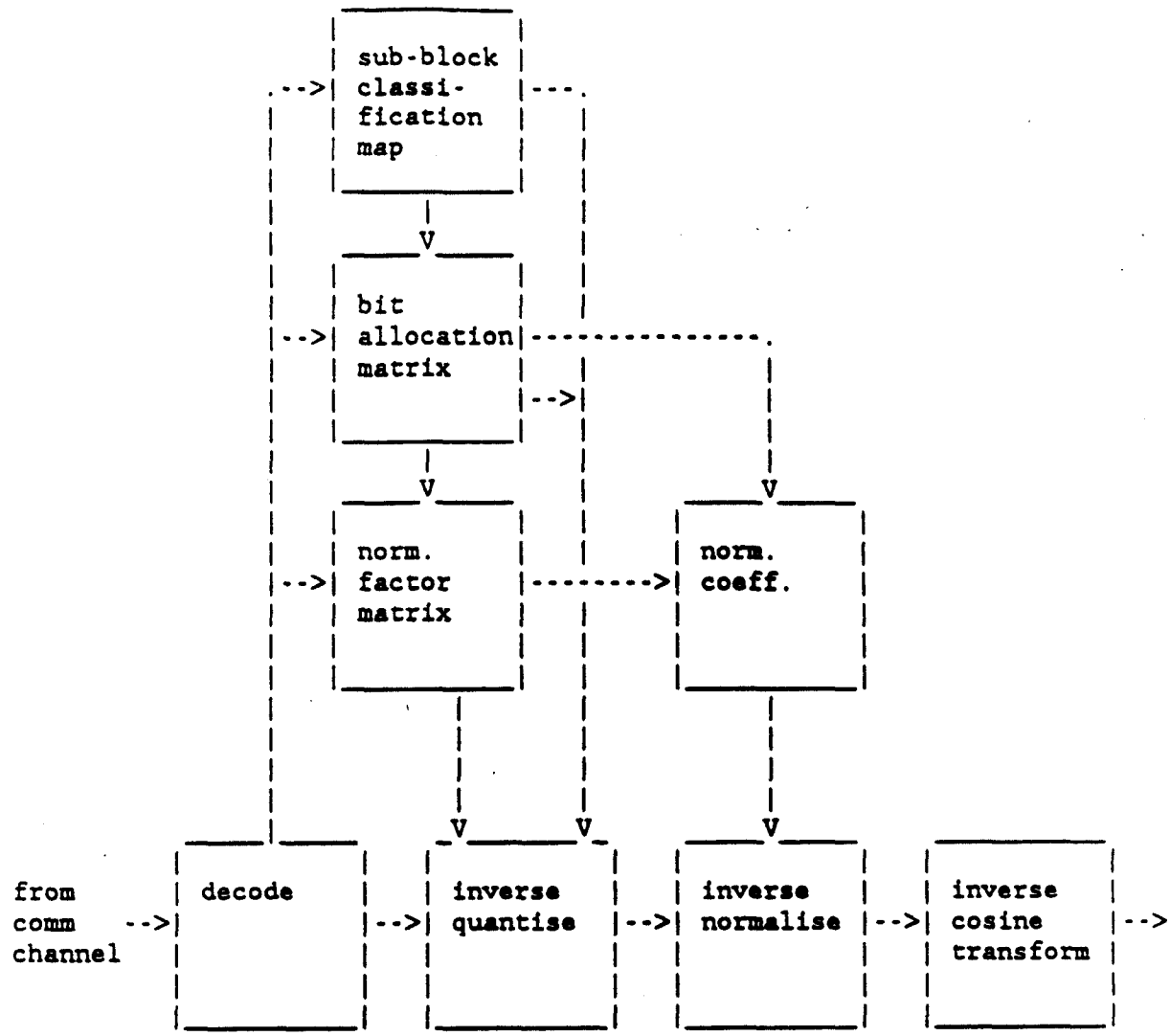


FIGURE B-3 COSINE TRANSFORM ADAPTIVE CODING SYSTEM - DECODE

B.2.2 Transform Sub-block Classification

The transform sub-block classification attempts to sort the transform blocks of an image according to criteria which may be functions of image activity, directionality, fineness etc present within each transform sub-image.

After the calculation is performed, the whole range of values of the chosen criterium is divided amongst the number of classes which serve the principle of adaptivity. Within limits, the greater the number of classes the better the adaptivity.

Finally a classification map is generated within which each sub-image is identified by its class identifier. This identifier acts as an index to the bit allocation table associated with that class.

B.2.3 Bit Allocation Table

This step allocates a number of coding bits to individual elements according to their class reference and to a fixed data rate for an average distortion at or below an acceptable level (rate-distortion theory). Bits are then distributed between "busy" and "quiet" image areas to provide the desired adaptivity - more bits being assigned to areas of high image activity and less to those of low activity.

The bit allocation strategy is at the designer's convenience. The following scheme provides for a maxium of 16 different classes.

B.2.4 Normalisation of Coefficients

This calculation is performed to

- avoid clipping of the transform samples prior to quantisation
- use normalised quantisers associated with normalised probability laws.

In order to use normalised probability densities

$$\text{eg} \quad \rho(x) = \frac{1}{\sqrt{2\pi}} \cdot e^{-\frac{x^2}{2}}$$

for the definition of quantisers it is appropriate to specify normalised values for the transform coefficients on which the quantification process is applied.

The normalisation of the transform coefficients is performed through the following scheme:

for u, v = 0 the normalised value to be quantised is:

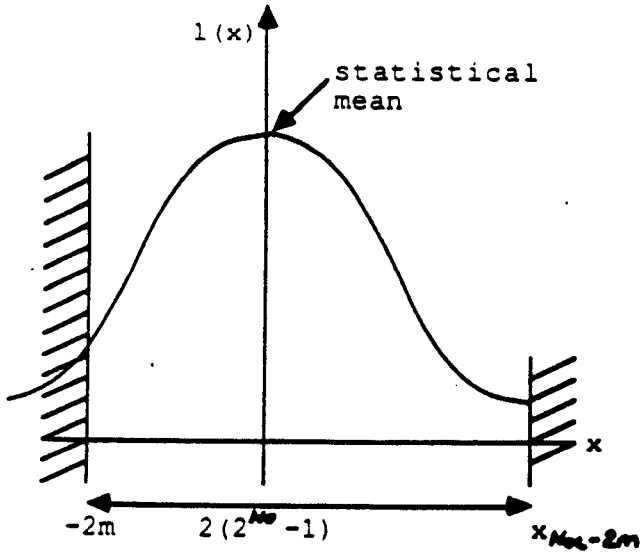
$$x = \frac{Fm,l(0,0) - 2m}{2(2^{Nd}-1)/X_{128}}$$

where M = E f(j,k)

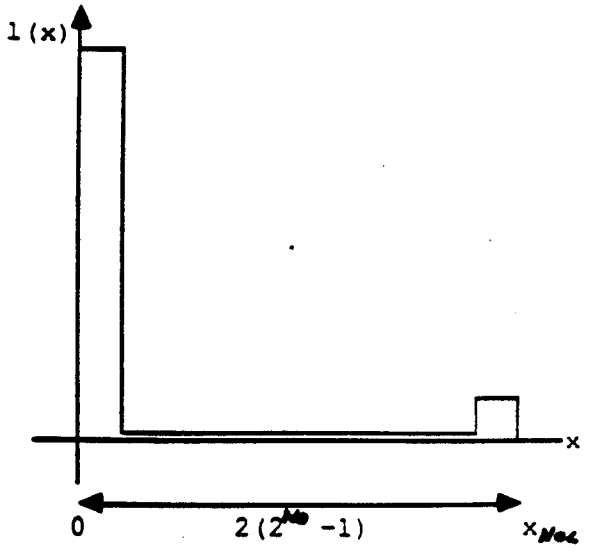
N number of bits per pixel in the original image f(j,k)

X the highest 8 bit decision level

This guarantees that no dc values are clipped.



Typical Case



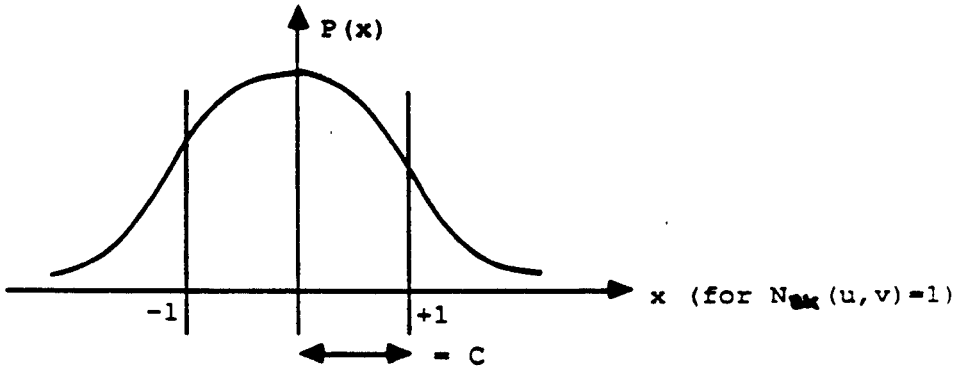
Worst Case
(one sub-block white, the other black)

for $u, v \neq 0$

$$x = \frac{Fml(u.v)}{C.2^{Nbk(u.v)-1}}$$

where $C = \sup_{u,v,k} C_x(u,v)$ for $Nbk(u,v) = 1$

$$E \quad Fm,1(u,v) = 0$$



At the receiving end after inverse quantisation the value of the nomalisation factor for Fm,1(o,o) and Fm,1(u,v) is required in order to obtain the correct value of the coefficient before processing the inverse cosine transform.

- For Fm,1(o,o) the value of Nd is required (default value is 8 bits)

- For Fm,l(u,v) the value of C is required (no default value)

B.2.5 Quantisation

The normalised samples are optimally quantised with the number of quantisation levels (bits) set according to the bit allocation tables. The quantisation process attempts to define a relationship between a transform coefficient Fm,l(u,v) and a binary number from Nbk (u,v) bits from the appropriate bit allocation table. This relationship is derived from the distribution law of the coefficients and some function of the error between the input and the output of the quantiser.

The Gaussian distribution law used:

$$p(x) = \frac{1}{\sqrt{2\pi}\,\sigma(u,v)} e^{-\frac{x^2}{2}}$$

with x in the general form

$$x = \frac{Fm,l(u,v) - 2m}{\sigma_k(u,v)}$$

The criterion used as a function of the error between the input and the output of the quantiser is the mean squared error:

$$D = \sum_{i=1}^{2^{Nbk}} \int_{s_{in}(i)}^{s_{in}(i+1)} (s_{in} - s_{out})^2 . p(x) . dx$$

which gives

if x_k are the end points of the $2^{Nbk(u,v)}$ input ranges
y_k are the output levels of the corresponding input ranges

$$x_i = (y_i + y_{i-1} - 1)/2 \quad \text{for } i = 2, \ldots 2^{Nbk(u,v)}$$

and

$$\int_{x_i}^{x_{i+1}} (x - y_i) . o(x) . dx = 0 \quad \text{for } i = 1, \ldots 2^{Nbk(u,v)}$$

TABLE B-1 EXAMPLE FOR Nbk = 1, 2, 3 BITS

	N = 2		N = 4		N = 8	
i	x_i	y_i	x_i	y_i	x_i	y_i
1	0.0	0.7980	0.0	0.4528	0.0	0.2451
2			0.9816	1.510	0.5006	0.7560
3					1.050	1.344
4					1.748	2.152
Error	0.3634		0.1175		0.03454	

B.3 APPLICATION OF THE DISCRETE COSINE TRANSFORM

DCT image coding may be performed in various ways, this application uses 1 to 2 bits per pixel to code colour images.

This application is coded for with

<ICT> = 2/4 3/2 3/1 3/0

(coding ident, transform, cosine, two dimensional)

B.3.1 Image Structure

The whole image (two fields) is used.

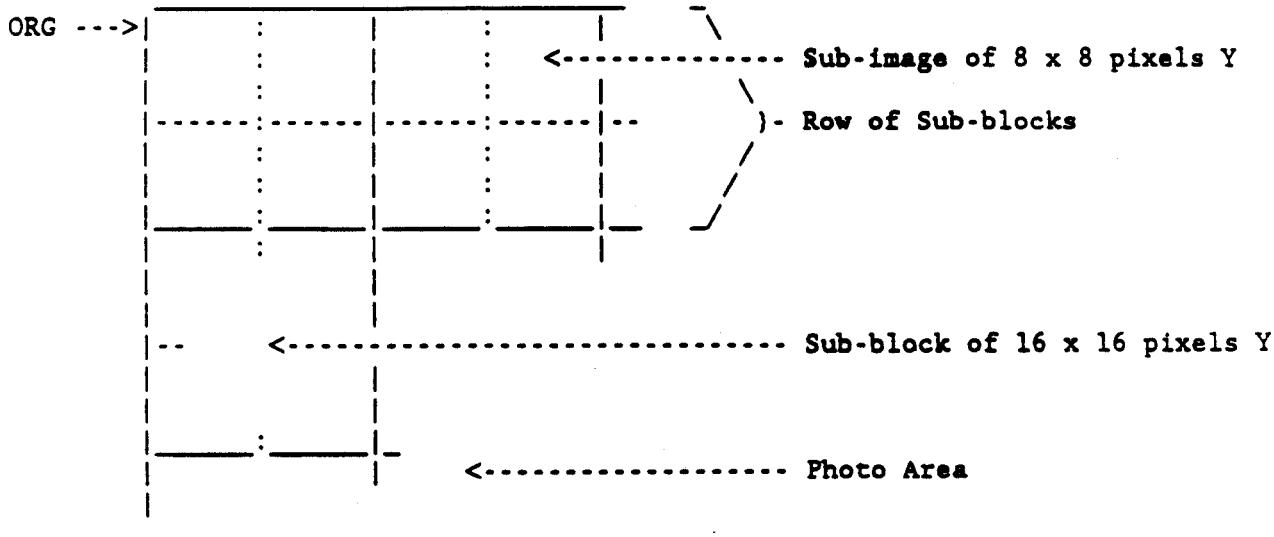


FIGURE B-4 IMAGE STRUCTURE

B.3.1.1 Spatial Structure

The sampled image has the following structure (Figure B-5).

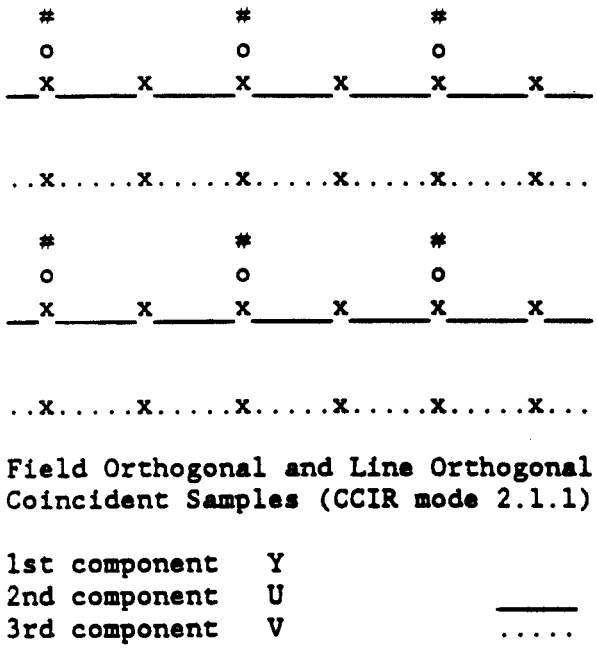


FIGURE B-5 SAMPLING STRUCTURE

B.3.1.2 Temporal Structure

The transmitted transform image has the following structure (Figure B-6).

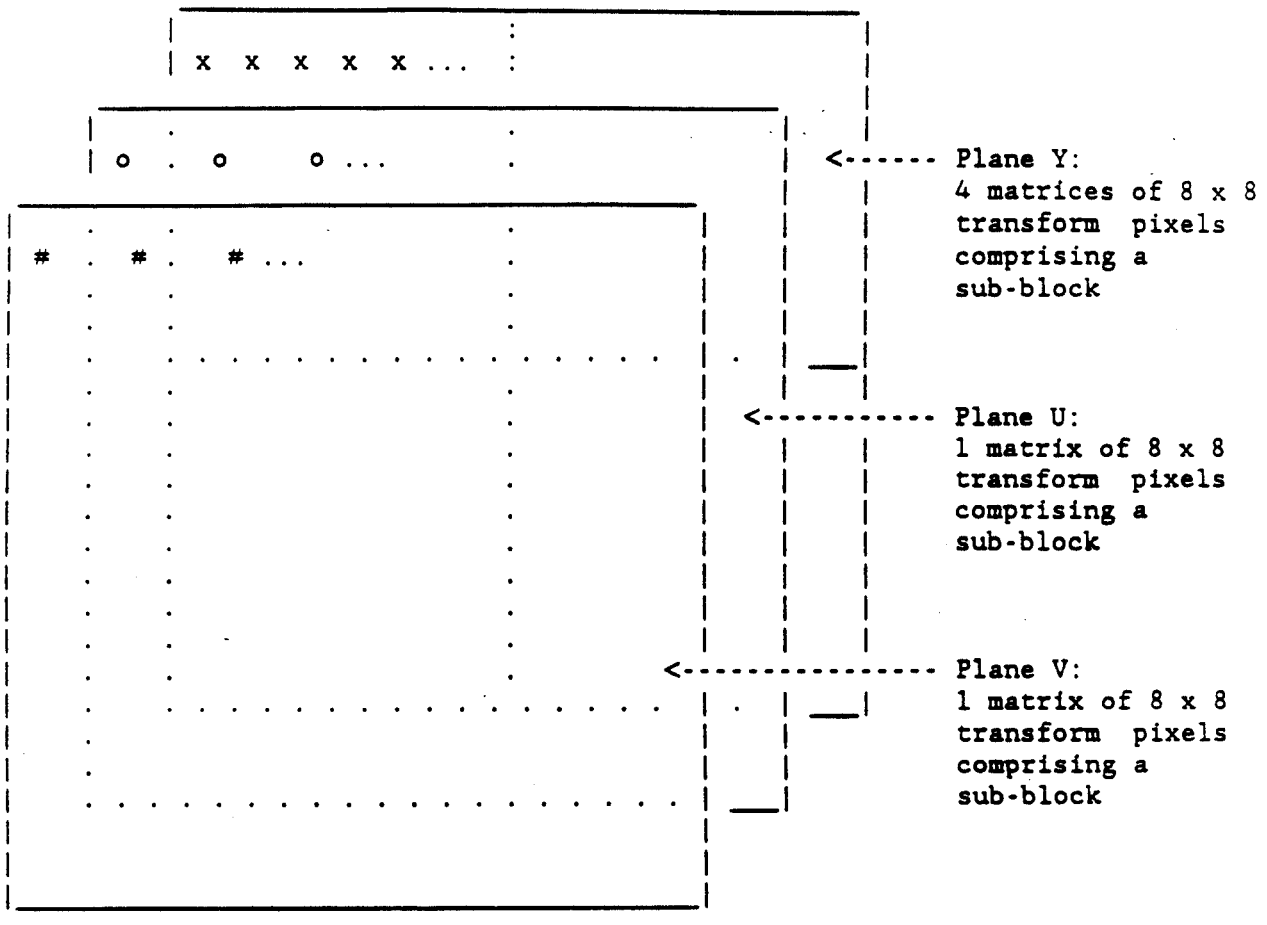


FIGURE B-6 TRANSMITTED TRANSFORM IMAGE STRUCTURE

In mode 2.1.1 one sub-block U (8 x 8) and one sub-block V (8 x 8) are transmitted for each sub-block Y (16 x 16).

B.3.2 Coding Parameters

These parameters will be implicity specified via <SCM> in the sub-sub-type byte with the coded value 3/0.

The parametes are:

sub-block of 16 x 16 pixels (based on first component)

sub-image of 8 x 8 pixels (based on first component)

1 to 16 activity classes

quantisation law using Gaussian distribution of densities

source image quantised with 8 bits per component.

B.3.3 Table Types and Structures

The image is defined using three tables.

B.3.3.1 Table 1

This defines the following:

mY = Ey { f(j,k) }	: mean of the Y component over the whole image on one unsigned byte
CY	: normalisation coefficient* of Ym for (u,v) = 0 coded as M x 2 with the mantissa M on two bytes and the exponent n on one signed byte
mU = Eu { f(j,k) }	: mean of the U component over the whole image on one unsigned byte
CU	: normalisation coefficient* of Y for (u,v) = 0 coded as M x 2 with the mantissa M on two bytes and the exponent n on one signed byte
mV = Ev { f(j,k) }	: mean of the V component over the whole image on one unsigned byte
CV	: normalisation coefficient* of V for (u,v) = 0 coded as M x 2 with the mantissa M on two bytes and the exponent n on one signed byte

The normalisation coefficient for Fm,1(o,o) is not transmitted as the most likely value of Nd is 8 bits and thereforee this is the default value.

B.3.3.1.1 Data Structure

The data will be sent in the following sequence (mY first):

mY CY mU CU mV CV

(bytes are sent most significant bit first)

B.3.3.2 Table 2

This defines the following:

N luminance bits allocation tables
N U component bits allocation tables
N V component bits allocation tables

B.3.3.2.1 Data Structure

Four bits are provided for allocation of fifteen bits per coefficient.

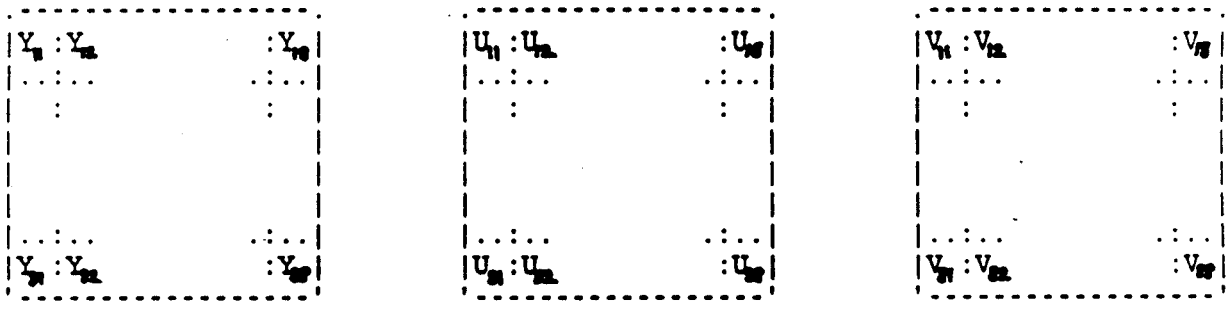


FIGURE B-7 BIT ALLOCATION TABLES

For each table data is transmitted a row by row, comencing with byte (most significant bit first). Tables are transmitted in order Y, U and then V.

If required the data related to each component may be transmitted in separate Transparent data VPDEs. (See Part 7.)

B.3.3.3 Table 3

This is a table of variable length which describes the activity over the whole image. Each sub-image is given a 4-bit reference to one of the classes.

B.3.3.3.1 Data Structure

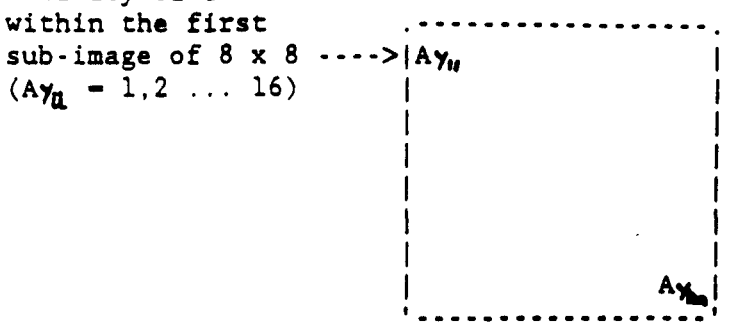


FIGURE B-8 ACTIVITY TABLE FOR Y

Similar tables are transmitted for U and V with appropriate numbers of coefficients. (Four times fewer U and V coefficients than Y when in 2.1.1 mode.)

For each table data is transmitted a row by row, comencing with byte (most significant bit first). Tables are transmitted in order Y, U and then V.

If required the data related to each component may be transmitted in separate Transparent data VPDEs. (See Part 7.)

B.3.4 Photographic Pixel Transfer Unit

The header is not described here as it depends on the particular image being transmitted. Photographic pixel data is transmitted in Transparent data mode (See Part 7).

In order to avaoid propagation of errors through consecutive sub-blocks, each sub-block description is resynchronised by a new Transparent VPDE with an appropriate length indicator.

Each sub-block is coded with transformed and quantised coefficients sent in sequence as follows:

US 3/4 <ORG> <ARE>

US 3/15 length Y1 Y2 Y3 Y4 U V

US 3/15 length Y'1 Y'2 Y'3 Y'4 U' V'

US 3/15 length Y"1 Y"2 . . .

:
:

B.4 EXAMPLE OF CODING FOR DCT

The VPDEs will take the form:

PIXEL HEADER UNIT

VPCE	US	3/4	2/0			
SDC						Colour YUV (default)
Display composition	2/1	3/4	3/1	3/6	3/11	416Hy x 625Vy
		3/6	3/2	3/5	3/11	
		3/2	3/0	3/8	3/11	208Huv x 312Vuv
		3/3	3/1	3/2	3/11	
	2/3	3/0	3/1			fields & lines alternate samples
SMC coding method	2/4	3/2	3/0	3/0		discrete cosine transform - two dimensional

TABLE TRANSFER UNIT

Table 1 Header

VPCE	US 3/5 2/0	
Table Set	2/1 3/1 3/11 3/3 3/11	Table 1; 3 sub-tables
Table Size	2/2 3/8 3/11 3/9 3/11	Z = 8 bits, Y = 9

Table 1 Transfer

VPCE	US 3/5	
Address	2/1 3/1 3/11	Table 1; address 0
Data	US 3/15 0/11 transparent data ...	

Table 2 Header

VPCE	US 3/5 2/0	
Table Set	2/1 3/2 3/11 3/3 3/11	Table 2; 3 sub-tables
Table Size	2/2 3/4 3/11 3/1 2/2 3/8 3/11	Z = 4 bits, Y = 128

Table 2 Transfer

VPCE	US 3/5	
Address	2/1 3/2 3/11	Table 2; address 0
Data	US 3/15 5/3 transparent data ...	

Table 3 Header

VPCE	US 3/5 2/0	
Table Set	2/1 3/3 3/11	Table 3:
Table Size	2/2 3/4 3/11	Z = 4 bits, Y depending on image size

Table 3 Transfer

VPCE	US 3/5	
Address	2/1 3/3 3/11	Table 3; address 0
Data	US 3/15 length transparent data ...	

PIXEL TRANSFER UNIT

VPCE	US 3/4	
<ORG>		Top Left DDA (default)
<ARE>	2/13 3/1 3/6 3/0 3/11 3/3 3/2 3/0 3/11	X = 160 pixels Y = 320 pixels
Data	US 3/15 length transparent data ...	

PART 4 Define DYNAMICALLY REDEFINABLE CHARACTER SETS (DRCS)

CONTENTS

1.0 INTRODUCTION

A DRCS is a set of characters whose shapes are sent from the service and down-loaded via the line. It may be used to represent alphabetic characters, special symbols, or picture element symbols for constructing fine graphics. Once loaded, the DRCS are regarded as members of a library that can be designated by appropriate ESCAPE sequences as G0, G1, G2 or G3 sets.

Two types of DRCS have been identified. The first type is the basic DRCS. Only the shapes of the characters are down-loaded. Characters are displayed on the screen in the prevailing foreground colour on the prevailing background colour. In the second type of DRCS the down-loaded characters are completely defined in foreground colours, ie all the dots of a character cell have a defined foreground colour, chosen from a number of colours.

The protocol defined below for down-loading of DRCS allows down-loading of both types of DRCS. The protocol is open ended to allow for future extensions.

The down-loading of DRCS is accomplished using units of two types:

DRCS header units

DRCS pattern transfer units.

A DRCS header unit describes the general properties of the DRCS to be loaded. The actual pattern transfer takes place using DRCS pattern transfer units. Both units are coded as Videotex Presentation Data Elements (VPDE) in acccordance with the Presentation Level Data Syntax (PLDS) as:

US 2/3 Y <data>

Y = 2/0 indicates DRCS header units
Y ≠ 2/0 indicates DRCS pattern transfer units.

2.0 DRCS HEADER UNITS

A DRCS header unit applies for all following pattern transfer units until the header is redefined or until the end of a session. A DRCS header unit is coded as:

US 2/3 2/0 <ICS> <SDC> <SCM> <SSA>

The various fields of the DRCS header unit are coded with bytes from different columns of the code table. If the default conditions apply these fields are omitted. The default conditions are specified in the description of the fields. They are independent of previously loaded header units.

2.1 <ICS>: Identification of Character Set

The <ICS> field identifies the DRCS to be loaded, by a number which will consequently be used in the designation sequence for this set. With the exception of the last byte, all the bytes of the <ICS> field are taken from column 2 of the code table.

<ICS> : 2/k F

k: Indicates whether the set belongs to the first or second repertory in the library (see Section 5 for the designation sequence). It also indicates whether a possibly existing DRCS identified by the same <ICS> field should be deleted or merely be overwritten by the following pattern transfer units.
0: first repertory, do not delete existing DRCS
1: second repertory, do not delete existing DRCS
8: first repertory, delete existing DRCS
9: second repertory, delete existing DRCS

F: If the DRCS is registered in ISO 2375 then F is the character allocated by ISO.
If the DRCS is a non-registered set then the sequence 2/0 Fx is transmitted. Fx can be taken from columns 4 to 7 of the code table.

The default for <ICS> is: 2/0 2/0 4/0, which will identify a non-registered set of the first repertory to be loaded in the library with final character for designation 4/0. An existing DRCS in this library position will not be deleted.

2.2 <SDC>: Select Dot Composition

The <SDC> field describes the structure of the cells of the DRCS to be loaded. The <SDC> field also discriminates between the two types of DRCS.

There are two alternative types of <SDC>.

2.2.1 SDC Type 1

The first type is coded with bytes from column 3 of the code table. This is the extended type of <SDC>. Its coding will allow for future extension of the DRCS architecture.

<SDC> type 1 : <character cell> <blocking factor> <pixel characteristics>

<character cell> : 3/th 3/uh 3/11 3/tv 3/uv 3/11

th : (0,1...9) : tens of horizontal pixels, leading zeros may be omitted *
uh : (0,1...9) : units of horizontal pixels, no default for the number of horizontal pixels
tv : (0,1...9) : tens of vertical pixels, leading zeros may be omitted *
uv : (0,1...9) : units of vertical pixels, default number of vertical pixels = 10

<blocking factor> : indicates the grouping of character cells (horizontal x vertical) for a rectangular character block. This character block is considered as a single character cell during the character description. When down-loaded in the terminal a character block occupies h x v consecutive character positions in the DRCS. The coding of the <blocking factor> is: 3/th 3/uh 3/11

3/tv 3/uv 3/11

th : (0,1...9) : tens of horizontal character cells, leading zeros may be omitted *
uh : (0,1...9) : units of horizontal character cells
tv : (0,1...9) : tens of vertical character cells, leading zeros may be omitted *
uv : (0,1...9) : units of vertical character cells

The default coding for the <blocking factor> is 3/1 3/11 3/1 3/11, indicating a character block of 1x1 character cell.

<pixel characteristics> : for further study. The default condition is 1 bit/dot/pixel basic DRCS.

* The coding scheme allows more significant digits to be added if needed.

2.2.2 SDC Type 2

The second type of <SDC> is coded with bytes from columns 4 and 3 of the code table. This is the shorthand type of <SDC>.

<SDC> type 2 : 4/p <blocking factor> 4/q

p : indicates envisaged recommended dot matrix sizes (horizontal x vertical). There is no default for p.

0:	16x24	8:	8x12
1:	16x20	9:	8x10
2:	16x12	10:	6x12
3:	16x10	11:	6x10
4:	12x24	12:	6x 5
5:	12x20	13:	4x10
6:	12x12	14:	4x 5
7:	12x10	15:	6x 6

<blocking factor> : as above

q : indicates the number of bits per dot used to code the DRCS. The default for q is 1, indicating 1 bit per dot basic DRCS. Colour DRCS is coded with q ≠ 1 :

1: 1 bit/dot basic DRCS
2: 2 bit/dot colour DRCS, 4 colours
default DCLUT: black, red, green, yellow
3: 3 bit/dot colour DRCS, 8 colours
default DCLUT: 1st colour palette
4: 4 bit/dot colour DRCS, 16 colours
default DCLUT: 1st and 2nd colour palettes (or 3rd and 4th colour palettes if the 1st and 2nd colour palettes are not redefinable)

The colours as mentioned above can be modified by loading the DRCS Colour Look Up Table (DCLUT). See Part 5, redefinable colours.

Since there is no default for some bytes in the <SDC> a DRCS header unit must always contain at least part of an <SDC>. If <SDC type 1> is used, at least 3/uh and 3/11 must be contained in the header; if <SDC type 2> is used, 4/p must be included in the header.

2.3 <SCM>: Select Coding Method

The <SCM> field determines the way in which the DRCS patterns are coded as they are down-loaded. Details of the coding are also determined by the <SDC> field (eg matrix size, bits per dot, blocking factor, pixel characteristics). The bytes of the <SCM> field are taken from column 5 of the code table, see Page 11.

<SCM> : <type> [<sub-type>]

<type> : 5/t (default t=0)

<sub-type> : 5/st

The <type> field identifies the coding method of the DRCS to be down-loaded. Some coding methods require a <sub-type> field to identify options within the coding method.

t = 0: 'direct' coding, described in 4.1
no <sub-type> needed
t = 1: 'Runlength' coding, described in 4.2
the default coding for st = 0

Other coding methods are for further study.

2.4 <SSA>: Select Set Attributes

The <SSA> field describes the actions which certain attributes will have on the DRCS characters once they are displayed on the screen. The bytes of the <SSA> field are taken from column 6 of the code table see Page 11.

The details of the <SSA> are for further study.

The default for <SSA> is such that the LINED attribute causes an underline, as for alphanumeric characters, but has no effect on colour DRCS.

3.0 PATTERN TRANSFER UNITS

Pattern transfer units are coded as:

US 2/3 Y <pattern data>

Y: the code of the first character (or character block) described in the unit; it has a value in the range 2/1 to 7/14 inclusive.

The <pattern data> field of a pattern transfer unit describes the patterns for the characters of the down-loaded DRCS, in accordance with the last received DRCS header unit.

The value of the Y parameter defines the code of the first defined character. If the pattern transfer unit contains more character definitions, they will be assigned subsequent codes. Data contained in a pattern transfer unit for a character subsequent to a character with code 7/14 will be discarded.

The coding methods to be used in the <pattern data> are described in Section 4.

4.0 CODING METHODS

In the following sub-sections the recommended coding methods, as indicated in the <SCM> field of the DRCS header units, are defined.

4.1 'Direct' Coding Method

The 'direct' coding method is identified by t=0 (default value) in the <SCM> field of the DRCS header unit.. No <sub-type> is needed for this coding method. The method can be used to load basic DRCS as well as colour DRCS.

4.1.1 Basic DRCS

A DRCS character cell consists of m dots horizontally and n dots vertically (in total m x n dots). The values of m and n are determined by the <SDC> field of the DRCS header unit. The direct coding method can be used for all possible values of m and n.

The dots of a character are coded using bytes from columns 4 to 7 of the code table, these bytes are called D bytes. The dots are loaded six dots at a time, row by row, starting from the top left hand corner, using the six least significant bits. Dots defined as '1' are displayed in foreground colour.

To improve the efficiency of this code a number of special commands have been added. They are coded as bytes from column 2 of the code table (see page 11) and are called S-bytes. The coding of these bytes is:

code	name	description
2/0	Sf	fill rest of character with '0's
2/1	R1	repeat last complete row once
2/2	R2	repeat last complete row twice
2/3	R3	repeat last complete row 3 times
2/4	R4	repeat last complete row 4 times
2/5	R5	repeat last complete row 5 times
2/6	R6	repeat last complete row 6 times
2/7	R7	repeat last complete row 7 times
2/8	R8	repeat last complete row 8 times
2/9	R9	repeat last complete row 9 times
2/10	R10	repeat last complete row 10 times
2/12	S0	defines a complete row containing '0's
2/13	S1	defines a complete row containing '1's
2/14	Sr	fill rest of character with last complete row
2/15	Ss	fill rest of character with '1's
3/0	B1	start of pattern block for new character

The pattern block for each DRCS character is preceded by the command B1 (3/0).

The insertion of an S-byte may leave a number of remaining bits in the previous D-byte, which will not define a complete row. The use of these bits is explained below.

The actions of the Sf (2/0) command are as follows. The remaining bits of the last D-byte are used as the first bits of the next row; the rest of this row and the possibly remaining rows of the character are filled with '0's. The action of the Ss (2/15) command is equivalent, but with the character filled with '1's.

The Sr (2/14) command causes the last complete row to be copied in the remaining rows of the character. Remaining bits in the last D-byte are discarded.

For the remaining commands S0 (2/12), S1 (2/13) and R1 (2/1) to R10 (2/10) the processing of the remaining bits in the last D-byte is postponed until the action indicated by the command is executed. Together with the next D-byte (or Sf or Ss) these bits are used for the definition of the remaining part of the character. If the rest of the character is completely defined by the commands mentioned in this paragraph the remaining bits are discarded.

The extent of the repeat command cannot cross the border of a character block. If a repeat command is used as the first byte of a character definition (ie the first byte after a B1 command) the action is as if the last complete row consisted of all '0's.

If a B1 command is received before a character is completely defined, the remaining part is defined as all '0's. Excess bytes before a B1 command are ignored.

4.1.2 Colour DRCS

In the pattern transfer units for colour DRCS, a number of bits per dot are down-loaded to identify the colour of each dot. In the 'direct' coding method the pattern information for the DRCS is transmitted as one or more pattern blocks for each DRCS character. A pattern block defines one bit of each of the dots of the DRCS character as shown in Figure 1 below. The pattern blocks are separated by separation bytes (B-bytes) coded from column 3 of the code table (see Table 1 page 11).

code	name	description
3/0	B1	start of the 1st pattern block of a DRCS character, defining the least significant bit of the dot
3/1	B2	start of the 2nd pattern block
3/2	B3	start of the 3rd pattern block
3/3	B4	start of the 4th pattern block

Equal pattern blocks only have to be transmitted once. In that case the pattern block is preceded by the two (or more) separation bytes to which the pattern block applies.

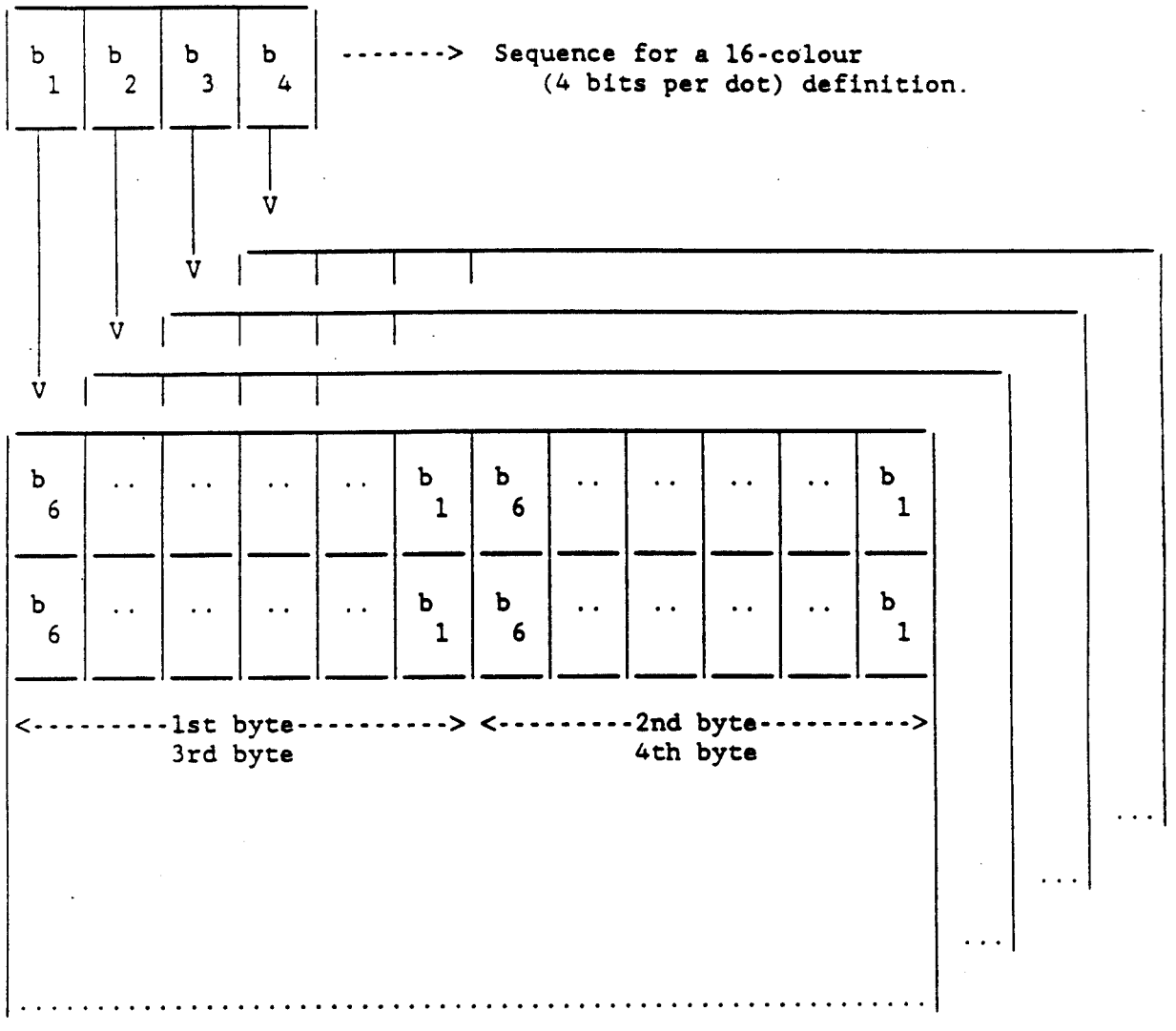


FIGURE 1 DRCS DOWNLOADING FORMAT DEFINITION FOR A 12 x 10 DOT MATRIX

Examples of pattern transfer units for colour DRCS are given below:

Sixteen-colour DRCS (4 bits per dot):

```
US  2/3  Y  3/0  <1st pattern block>  3/1  <2nd pattern block>
              3/2  <3rd pattern block>  3/3  <4th pattern block>  3/0  ...

US  2/3  Y  3/0  3/1  3/2  <pattern block>  3/3  2/0  3/0  ...
```

In the second example the pattern blocks for the first three bits of the dots are equal, while the fourth bit is '0'.

Four-colour DRCS (2 bits per dot):

```
US  2/3  Y  3/0  <1st pattern block>  3/1  <2nd pattern block>  3/0  ...
```

4.1.3 Direct Coding Code Table

TABLE 1 DIRECT CODING CODE TABLE

	0	1	2	3	4	5	6	7
0			Sf	B1	0	16	32	48
1			R1	B2	1	17	33	49
2			R2	B3	2	18	34	50
3			R3	B4	3	19	35	51
4			R4		4	20	36	52
5			R5		5	21	37	53
6			R6		6	22	38	54
7			R7		7	23	39	55
8			R8		8	24	40	56
9			R9		9	25	41	57
10			R10		10	26	42	58
11					11	27	43	59
12			S0		12	28	44	60
13			S1		13	29	45	61
14			Sr		14	30	46	62
15			Ss		15	31	47	63
			S-	B-	<-------- D-bytes --------			>

4.2 'Runlength' Coding Method

The runlength coding method is identified by t=1 in the <SCM> field of the DRCS header unit. In some cases a <sub-type> field is needed for this coding method. The default value for the <sub-type> is 5/0 (st=0).

The runlength coding method can be used for basic DRCS as well as colour DRCS, although the method may be best used for advanced types of colour DRCS using a non-default <blocking factor>.

The following general rules apply for runlength coding.

Runlength coding uses the six least significant bits from bytes of columns 4 to 7 of the code table. These bits are identified as b6, b5, b4, b3, b2 and b1 (b1 is the least significant).

Runlength coding is applied on character blocks as defined by the <SDC> field of the header unit (default 1 x 1), row by row, starting from the top left hand corner of the block.

If a runlength exceeds the right hand border of the character block, the remaining part of the runlength is continued on the next row. If it exceeds the right hand border of the last row of the character block the remaining part is ignored.

4.2.1 Basic DRCS

Two types of runlength coding for basic DRCS are specified. The first type is identified by st=0 (default). In this case the runlength is coded with three bits:

b6,b5,b4: runlength for the background colour
b3,b2,b1: runlength for the foreground colour

The coding for each runlength is:

code	length
001	0
010	1
011	2
100	3
101	4
110	5
111	6
000	escape

If the escape code is used, the six bits of the following byte are completely used to code the runlength (1 to 63). If both runlengths in a byte are coded as escape, the second byte will contain the runlength of the background colour and the third byte the runlength of the foreground colour.

The second type of runlength coding for basic DRCS is defined by st=1. In this case the coding is:

b6: 0 runlength for background colour
1 runlength for foreground colour

b5,b4,b3,b2,b1: runlength (1 to 31)

4.2.2 Colour DRCS

For colour DRCS the runlength is coded per colour.

In the case of sixteen-colour DRCS the runlength coding will be:

b6,b5,b4,b3: colour definition

b2,b1: runlength
01 length 1
10 length 2
11 length 3
00 escape

If the escape code is used, the six bits of the next byte define the runlength (1 - 63).

For eight-colour DRCS the runlength coding will be:

b6,b5,b4: colour definition

b3,b2,b1: runlength (1-7)
000 escape

For four-colour DRCS the runlength coding will be:

b6,b5: colour definition

b4,b3,b2,b1: runlength (1-15)
0000 escape

5.0 DESIGNATION AND INVOCATION OF DRCS

Once a DRCS (or part of it) is down-loaded, the set is considered part of the library. The set can then be designated by the ESC-sequence.

ESC I F

I= 2/k+i

k: 8 or 12 indicating the first or second repertory. The value for k should be in accordance with the value for k in the <ICS> field of the header unit of the required DRCS.

i: 0,1,2 or 3 depending on whether the set is designated as a G0,G1, G2 or G3 set respectively.

F : If the DRCS is registered in ISO 2375 then F is the character allocated by ISO.
If the DRCS is a non-registered set then the sequence 2/0 Fx is transmitted, where Fx is equal to Fx in the <ICS> field of the header unit of the required DRCS.

Once the set is designated, it can be invoked in the normal manner.

If a character block is to be displayed on the screen, the top left hand character cell will be positioned at the active position. After the display of the block the active position will be in the next position following the top right hand character cell of the block.

6.0 APPLICABILITY OF ATTRIBUTES

Unless the <SSA> field of the DRCS header unit defines otherwise all attributes shall apply in the normal way to DRCS characters, the only exception being that the LINED attribute is not applicable to colour DRCS.

Although in colour DRCS a character is completely defined in foreground colour, it should be remembered that at the position where a colour DRCS character is displayed there is a defined background colour, which should be applied in the case of, for example, the INVERT or the FLASH attribute.

PART 5 Define COLOUR

CONTENTS

1.0 INTRODUCTION

The alphamosaic C1 sets provide for the selection of eight colours. In this part the method used to extend this colour system and to redefine colours will be described.

2.0 COLOUR SYSTEM EXTENSION

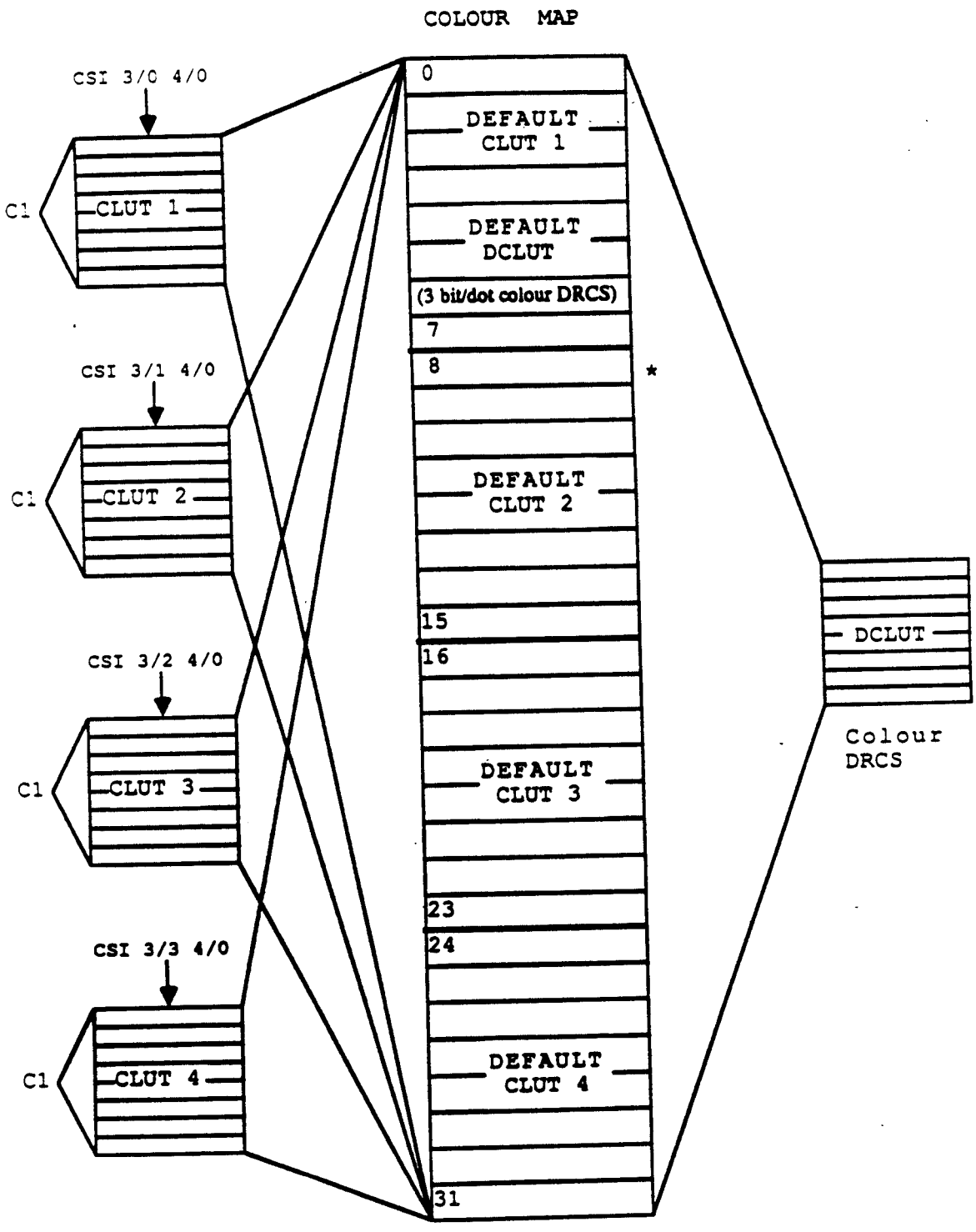
The extension of the colour system is accomplished by providing a number of colour tables of eight colours each. At a given instant only one table can be in use. This table is selected using a CSI sequence (see Part 1 Section 2.3.13). Each table is implemented as a Colour Look Up Table (CLUT) with eight entries. The entry in the 'in use' CLUT is selected using the C1 controls according to the table below.

C1 control colour	entry no. in CLUT
black	0
red	1
green	2
yellow	3
blue	4
magenta	5
cyan	6
white	7

The entry in the CLUT contains an ordinal number in the colour map. The contents of this colour map entry define the colour. In the alphamosaic mode four CLUTs are used. They are named CLUT1, CLUT2, CLUT3 and CLUT4. The size of the colour map is 32 entries, divided into 4 parts of 8 entries each.

For colour DRCS (see Part 4) separate look up tables called DCLUTs may be provided. A DCLUT contains a number of entries which are used to define the colours used in colour DRCS. The colour extension scheme is shown schematically in Figure 1.

FIGURE 1 COLOUR EXTENSION SCHEME



* If this entry (No 8) is defined as BLACK (as it is by default) it will be interpreted as TRANSPARENT

3.0 CODING OF REDEFINABLE COLOURS

The Define COLOUR VPDE is used to redefine the contents of the colour map, or to redefine the contents of the CLUTs or the DCLUTs. The coding is:

US 2/6 Y <data>

Y : determines the function of the Define COLOUR VPDE

2/0 : define COLOUR header unit
2/1 : define COLOUR reset unit
3/x : COLOUR transfer unit

3.1 COLOUR Header Unit

A COLOUR header unit applies for all following colour transfer units until the header is redefined or until the end of a session. The header unit is coded as:

US 2/6 2/0 <ICT> <SUR> <SCM>

<ICT> : Identification of Colour Table, is coded as: 2/a I

a : indicates the type of colour table
0 : colour map
1 : CLUT
2 : DCLUT

I : indicates the number of the unit indicated in 2/a.
I is in the range 2/0 to 7/15.

The default coding for <ICT> is 2/0 2/0, identifying the colour map No 1.

<SUR> : Select Unit Resolution, is coded as: 3/c.

c : (1,2...9) indicating the number of bits used to define each unit of the identified table.

The default value for <SUR> is 3/4.

<SCM> : Select Coding Method, is coded as: 4/d.

d : indicates the coding method
0 : entries in colour map
1 : load colour map using R,G,B

The default value for <SCM> = 4/1.

If necessary an extra byte (coded 4/e) may be added.

3.2 COLOUR Reset Unit

The COLOUR Reset Unit is used to reset all the colour tables (CLUTs, DCLUTs and colour map) to their default values. The reset unit is coded as:

US 2/6 2/1

3.3 COLOUR Transfer Units

COLOUR transfer units are used to load colour tables. The colour table to be loaded and the loading method used are defined by the 'Define COLOUR' header unit. The COLOUR transfer units are coded as:

US 2/6 Y <colour data>

Y : will indicate the first table entry to be loaded, and is coded as: 3/t 3/u

t : (0,1...9) tens of address, leading zeros may be omitted
u : (0,1...9) units of address *

<colour data> : bytes in the range of 4/0 to 7/15.

The meaning of the <colour data> depends on the preceding 'Define COLOUR' header unit and is defined in the following sub-sections.

3.3.1 Loading a CLUT or DCLUT

This function is identified by the last received 'Define COLOUR' header unit with <ICT> = 2/1 (CLUT) or 2/2 (DCLUT). The least significant <SUR> bits are taken from each byte of the colour data and stored in consecutive locations of the identified CLUT or DCLUT, starting at the address indicated by Y.

Data received for addresses outside the identified CLUT or DCLUT will be discarded.

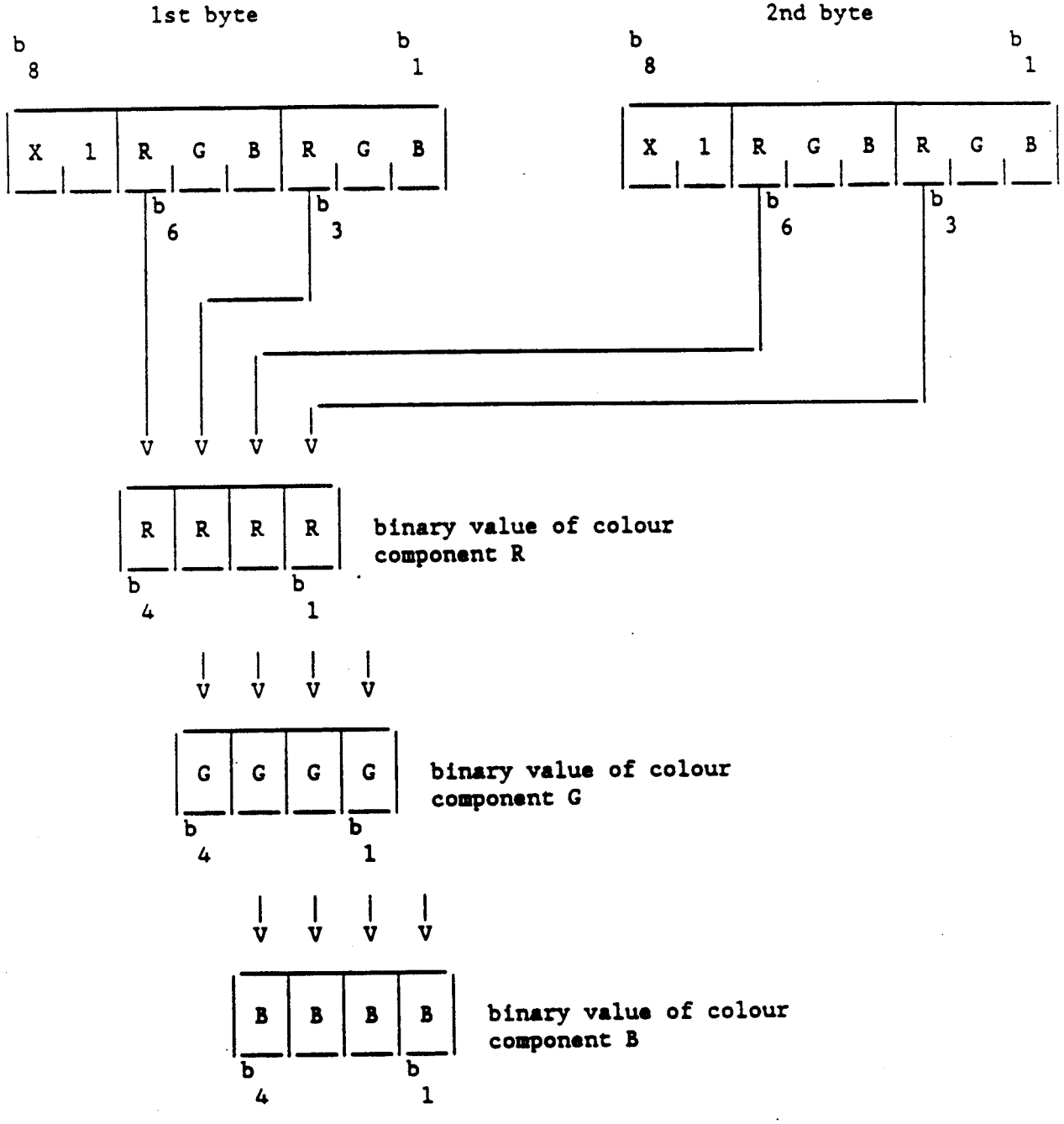
* The coding scheme allows more significant digits to be added if necessary.

3.3.2 Loading the Colour Map using R,G,B

This function will be identified by the last received 'Define COLOUR' header unit with <ICT> = 2/0 and <SCM> = 4/1, or the default header unit. The colour map is loaded starting at the address indicated by Y. The colours are defined in terms of their Red, Green and Blue components, each of which is defined by <SUR> bits.

Each <colour data> byte contains two bits for each of the primary colours, except for the last byte, which may contain only one relevant bit for each primary colour. The coding of the six least significant bits of the <colour data> bytes is: R G B R G B, the most significant bits defining the more significant bits of the colour components. A value of '0' for a colour component indicates zero intensity. All bits '1' indicate full intensity. Intermediate values are interpreted in equal brightness steps (eye corrected).

FIGURE 2 EXAMPLE OF COLOUR TRANSFER IN THE CASE OF DOWN LOADING VALUES OF RGB WITH 4 BITS EACH



PART 6 Define FORMAT

CONTENTS

1.0 INTRODUCTION

The 'Define FORMAT' VPDE is used to define the number of rows and columns displayed within the defined display area for the alphamosaic display.

The default alphamosaic display format is 24 rows of 40 characters.

The possibility of changing the aspect ratio of the defined display area using the 'Define FORMAT' VPDE is for further study.

When the 'Define FORMAT' VPDE is executed no assumption can be made about the subsequent contents of the screen.

2.0 CODING

The coding of the 'Define FORMAT' VPDE is as follows:

US 2/13 Y <CH> <CT> <CU> 3/11 <RH> <RT> <RU> 3/11 <WC>

If Y is 4/1 to 4/14 one of the following formats is defined:

4/1 : 40 columns by 24 rows
4/2 : 40 columns by 20 rows
4/3 : 80 columns by 24 rows
4/4 : 80 columns by 20 rows
4/5 : 48 columns by 20 rows
4/6 : 40 columns by 25 rows (numbered from 0 to 24)
4/7 to 4/14 are for further study

If Y is 4/15 the number of columns and rows is defined by the following data, where:

<CH> <CT> <CU> is the number of columns in hundreds, tens and units, coded from column 3 (leading zeros may be omitted); *

<RH> <RT> <RU> is the number of rows in hundreds, tens and units, coded from column 3 (leading zeros may be omitted). *

<WC> is used to define the wraparound controls. <WC> takes the following values:

7/0 : wraparound ON
7/1 : wraparound OFF

3.0 DEFAULTS

The default 'Define FORMAT' VPDE is:

US 2/13 4/1 7/0

* The coding scheme allows more significant digits to be added if necessary.

PART 7 TRANSPARENT DATA

Refer to T/TE 06-03

PART 8 RESET

CONTENTS

1.0 INTRODUCTION

This function is used to set predefined states in the terminal and thereby synchronise the Videotex service and the terminal at the presentation layer.

2.0 CODING STRUCTURE.

The coding structure for the Reset function is as follows:

US 2/15 <operation> <parameter>

<operation>: This character indicates the display mode being reset, and the operation required. This character is coded from columns 2 to 4 of the code table.

<parameter>: This character is coded from columns 4 to 7 of the code table. Its meaning depends upon the reset operation.

3.0 FUNCTIONAL DESCRIPTION AND CODING.

3.1 General Display Reset

By means of the General Display Reset the terminal can be brought into a defined condition, regardless of the the terminal mode. It's function is to combine the actions of the Reset operation for the Alpha-mosaic display, the Geometric display, the Photographic display etc. It's actions are summarized below:

- The actions as described in section 3.2. (Reset Control and Graphic Sets) are executed.
- The format is set to default to 24 rows of 40 characters.
- The Alpha-mosaic DDA shall be filled with spaces.
- The active position is set to the first character position of the first row.
- All attributes of the Alpha-mosaic display are set to their default values as described in Part 1 para 1.5.2.

- The actions on the geometric display (refer to T/CD 06-02) can be described as follows:

  General Display Reset is equivalent to the execution of the following sequence of primitives:

```
DEACTIVATE WORKSTATION (ws_id) for all workstations
CLOSE WORKSTATION (ws_id) for all workstations
OPEN WORKSTATION (ws_id) for ws_id = 0
ACTIVATE WORKSTATION (ws_id) for ws_id = 0
SET DEFAULTS
SET WORKSTATION WINDOW (ws_id, P1, P2)
     ws_id = 0, P1 = (0.0, 0.0), P2 = (1.0, 0.75)
SET WORKSTATION VIEWPORT (ws_id, XMIN, XMAX, YMIN, YMAX)
     ws_id = 0, XMIN = 0.0, XMAX = 1.0, YMIN = 0.0, YMAX = 0.75
```

  Note: OPEN WORKSTATION (ws_id) ensures that the display surface is cleared.

- For the Photographic display all the Photographic tables are cleared and the Photographic display is set to transparent. (This is for further study)

- The action of a Timing Control Wait VPDE is terminated and the data received since the start of the Wait is deleted.

- The data following the General Display Reset function is to be interpreted as Alpha-mosaic data.

The coding of the General Display Reset is as follows:-

a) The serial C1 set is invoked

US 2/15 4/1

b) The parallel C1 set is invoked

US 2/15 4/2

Note: This command will be extended to reset other terminal display functions yet to be defined.

3.2 Reset Control and Graphic Sets

The actions of this function are as follows:-

- The default graphic sets as described in Part 1 para 1.5.6 are designated.

- In the 7-bit environment the G0 set is invoked into columns 2 to 7 of the code table.

- In the 8-bit environment the G0 set is invoked into columns 2 to 7 of the code table and the G2 set is invoked columns 10 to 15 of the code table.

- Data following the Reset Control and Graphic Sets is to be interpreted as Alpha-mosaic data.

and
a) The serial C1 set is invoked

US 2/15 4/3

or
b) The parallel C1 set is invoked

US 2/15 4/4

3.3 Service Break to Row X

This function affects the terminal from the time it is received until the next US command is received. The terminal resets to the previous state before the next US command is executed. The action of this function is as follows:

Previous display states, including character sets, colours attribute controls and the active position will be stored in the terminal but no longer active.

Down loading processes to the terminal will be terminated.

The primary set of graphic characters is designated the G0 set and the supplementary set of graphic characters is designated the G2 set. Other character sets are not affected.

In the 7-bit environment the G0 set is invoked into columns 2 to 7 of the code table.

In the 8-bit environment the G0 set is invoked into columns 2 to 7 of the code table and the G2 set is invoked into columns 10 to 15 of the code table.

The format is unaffected but wrap-around is inactive.

The active position is set to the first character position of the designated row.

Only the following controls of the primary control function set are valid:

in the 7-bit environment
APB, APF, APR, CAN, SS2, ESC(in combination with a character from columns 4 or 5 of the code table), US.

in the 8-bit environment
APB, APF, APR, CAN, US.

If the serial C1 set is invoked the following controls are invalid:

in the 7-bit environment
5/0 to 5/7, 5/11, 5/14, 5/15.

in the 8-bit environment
9/0 to 9/7, 9/11, 9/14, 9/15.

The protected area attribute is inactive, all other attributes are unchanged.

Colour look up table is active.

Data following is interpreted as Alpha-mosaic.

If a Service Break to Row X is received by a terminal while it is executing a Timing Control Wait VPDE, the Service Break is executed immediately, after which the original wait will be continued.

Coding: US 2/15 <CS> (RN)

<CS> The designated C1 set is coded as follows:
4/0 = serial C1-set
4/5 = parallel C1-set

(RN) The designated row is coded from columns 4 to 7 of the code table. The row number is indicated by the binary value of the 6 least significant bits. If the row X specified is outside the D.D.A. following data is displayed on the bottom row of the D.D.A.

To reset to the previous state following a Service Break the following coding is defined:

US 2/15 4/15

This function should follow a Service Break to Row X. It is only valid used in this way.

The protected area attribute is inactive, all other attributes are unchanged.

Previous display states, including character sets, colours, attribute controls and the active position will be restored by the function Reset to the Previous States.

PART 9 PROCESSABLE DATA

Refer to T/TE 06-04

PART 10 TERMINAL FACILITY IDENTIFIER

Refer to T/TE 06-05

PART 11 TIMING CONTROL

CONTENTS

1.0 INTRODUCTION

When displaying data on a terminal, it may be desirable to introduce certain timing controls such as the instruction to wait for a specified period before continuing the display of data. These controls are coded in Control Videotex Presentation Data Elements (Control VPDE) in the following form:

US 2/4 < control identifier > < data >

The Control Identifier determines the type of control and may be followed by optional data. The following Control Identifier has been coded:

2/1 : WAIT

The remaining codes for the Control Identifier are for future standardisation.

2.0 WAIT

The Wait Control VPDE is coded as follows:

US 2/14 2/1 < period >

The period specifies the wait time, in tenths of a second, to be observed between the decoding of the Wait Control VPDE and the start of the execution of the VPDE following the Wait Control VPDE. Data received during a wait period is stored in the terminal after it has been scanned for the inclusion of a General Display Reset (Part 8 para 3.3) or a Service Break to Row X (Part 8 para 3.3). If a General Display Reset is detected the wait period is terminated and all the data stored in the terminal between the start of the wait and the detection of the General Display Reset is deleted. The General Display Reset is executed immediately.

If a Service Break to Row X is detected it is executed as soon as possible. The original wait will then continue. No data stored in the terminal is deleted.

The period is decimally coded, most significant digit first, by codes in the range 3/0 to 3/9 inclusive and is terminated by the code 3/11.

A Wait Control VPDE indicating a wait period of 30 seconds would be coded as follows:

US 2/14 2/1 3/3 3/0 3/0 3/11

Annex B to Recommendation T/TE 06-01 (formerly T/CD 06-01)

Note 1: This annex is an integral part of the recommendation.
Note 2: All references to T/CD should be interpreted as T/TE.

CEPT

VIDEOTEX SERVICE REFERENCE MODEL : CONFORMANCE

Issue 5, Edinburgh, May 1988
(A Revision of Issue 4, Nice, June 1985)

VIDEOTEX SERVICE REFERENCE MODEL : CONFORMANCE

CONTENTS

ANNEX B

CEPT Videotex Service Reference Model : Conformance

Annex A. to recommendation T/CD 6-1 contains a data syntax for the encoding of many different facilities which may be provided by videotex services. In order to ease interworking between videotex services and to harmonise these services a selection of specific facilities which should be supported by all services has been made. The degree to which a service implements these facilities is determined by the service profile. The service profiles recognised by the CEPT are described in Annex C.

The rules for transcoding between the recognised profiles are for further study.

The following definitions apply:

RECOGNISE means to determine the syntactic form but not necessarily the semantics of a code sequence.

EXECUTE means to process a code sequence to allow the display of information conveyed by the code sequence and by subsequent code sequences.

PRESENT means to display the information conveyed by a code sequence and in the case of a control function, to display information affected by the control function.

Part 0 General

All Videotex Presentation Control Elements (VPCEs) shall be recognised (see Annex A, Part 0, section 1.1.1)

Part 1 Alpha-mosaic Displays

1.1 Alpha-numeric characters

1.1.1 Simple Alpha-numeric characters

The Latin primary set of graphic characters (Annex A Part 1 Table 8), excluding character positions 2/3, 2/4, 4/0, 5/11 to 5/14, 6/0 and 7/11 to 7/14 (which may be presented using fall-back characters) shall be recognised and presented.

Terminals with a Greek character capability shall recognise and present the Greek primary set of graphic characters (Annex A Part 1 Table 13).

1.1.2 Extended Alpha-numeric characters

All Alpha-numeric characters of the repertoire (see Annex A Part 1

Section 2.1.1) shall be recognised and presented.

1.2 Mosaic and other characters

1.2.1 Simple Mosaic and other characters

The block-mosaic character (see Annex A Part 1 Section 2.1.2) shall be recognised and presented.

1.2.2 Extended Mosaic and other characters

All mosaic, line drawing and miscellaneous characters of the repertoire shall be recognised and presented.

1.3 Format Effectors

1.3.1 Simple format effectors

The following format effectors; APB, APF, APD, APR, APU, CS and APH shall be recognised and executed.

1.3.2 Extended format effectors

All format effectors shall be recognised and executed, (see Annex A Part 1 Section 2.2)

1.4 Attribute Controls

1.4.1 Parallel attribute controls

The following shall be recognised and presented:

-Foreground colours
-Background colours
-Start lining and stop lining
-Normal size, double-height, double-width, double-size
-Flash and steady
-Conceal display and stop conceal
-Inverted polarity and normal polarity
-Start box and end box

1.4.2 Serial attribute controls

The following shall be recognised and presented:

-Alpha and Mosaic foreground colours
-New background and black background
-Start lining and stop lining
-Normal size and double height
-Flash and steady
-Conceal Display and Stop Conceal
-Start box and end box

1.4.3 Extended attribute controls

The following parallel and serial attribute controls shall be recognised and presented:

-Flash states: Flash, Steady, Inverted Flash and Reduced Intensity Flash
-Flash rates: Normal Flash, Fast Flash (three phases), Increment Flash and Decrement Flash
-Marking

Note: The fall back for Flash rate and Flash state is Normal Flash.
The fall back for Marking is Non Marking.

1.4.4 Full Row attribute controls

The following shall be recognised and presented:

-Foreground Colours
-Background Colours
-Lining
-Normal Size
-Normal Flash
-Steady
-Invert
-Window
-Conceal
-Protecting

Note: The fall back for Protecting is Non Protecting.

1.4.5 Full Screen Attribute Controls

The following shall be recognised and presented:

-Background Colour

1.4.6 Scrolling

1.4.6.1 Simple Scrolling

Implicit scrolling shall be executed.

1.4.6.2 Extended Scrolling

The definition of one scrolling area shall be recognised and executed.

Implicit and explicit scrolling shall be recognised and executed.

1.5 Device controls

All device control functions shall be recognised (see Annex A Part 1 Section 2.4).

Cursor On and Cursor Off shall be executed.

1.6 Coding Structure

7-bit or 8-bit coding shall be executed.

1.7 Invocation of Character Sets

The invocation of character sets for the 7 or 8 bit environment as appropriate shall be executed (see Annex A Part 1 Sections 3.1.2 and 3.1.3).

1.8 Designation of Character Sets

The designation of 4 fixed character sets shall be executed, (see Annex A Part 1 Sections 3.4.3).

For terminals with a Greek character capability, designation of the Greek primary set shall be executed (see Annex A Part 1 Section 3.4.4).

Note that no designation sequence is required for the set as this is fixed.

1.9 Colour Table Controls

The invocation of four colour tables shall be recognised and executed. (see Annex A Part 1 Section 3.5.6).

Part 2 Geometric Displays

Conformance to the Geometric Display is defined in T/CD 06-02.

Part 3 Photographic Displays

3.1 General

All header and transfer units (see Annex A Part 3 Sections 2.0,

3.0, 4.0 and 5.0) shall be recognised.

For further study

Part 4 Define DRCS

4.1 Designation and Identification

The designation of one DRCS set shall be executed, (see Annex A Part 4 Section 5.0).

Note: The library identification of the DRCS set is given in the down loading sequence.

The default Identify Character Set (ICS) (see Annex A Part 4 Section 2.1) shall be executed.

4.2 Character Matrices

4.2.1 Preferred Character Matrices

Select Dot Composition (SDC) type 2 (see Annex A Part 4 Section 2.2.2) shall be executed for the following character matrices:

12 X 10	6 X 10	6 X 5
12 X 12	6 X 12	6 X 6

4.2.2 8 dot type Matrices

8 X 10	4 X 10	4 X 5

The 8 dot type matrix set may be implemented as an alternative but where this is done the means shall be provided within the system for translating from and to systems having character matrices of a 12 X 10 type and its derivatives.

4.3 Bits Per Dot

4.3.1 Basic DRCS

Basic DRCS shall be executed and presented. (see Annex A Part 4 Section 2.2.2)

4.3.2 Colour DRCS

Colour DRCS shall be executed and presented with 4 and 16 colours per character, (see Annex A Part 4 Section 2.2.2), but 4 colour DRCS is acceptable for a transitional period.

4.4 Coding Method

The direct coding method shall be executed. (see Annex A Part 4 Section 2.3).

4.5 Addressing Capability

One DRCS set of 94 characters of basic DRCS shall be executed and presented.

Note: The presentation of the characters will be dependant upon the capabilities of the display device.

Part 5 Define COLOUR

5.1 Structure of the Colour Map

5.1.1 Size

The colour map shall consist of 32 colours. (see Annex A Part 5 Section 2.0).

5.1.2 CLUTs

Four fixed CLUTs (each of 8 colours) shall be executed and presented.

5.1.3 DCLUTs

Two DCLUTs shall be executed and presented:

- one for 4 colour DRCS
- one for 16 colour DRCS

5.2 Definition

The RGB loading method shall be executed. (see Annex A Part 5 Section 3.3.2.).

5.2.1 Colour Map

The definition of colours 16 to 31 of a single colour map (ICT 2/0 2/0) shall be executed (see Annex A Part 5 Section 3.1).

5.2.2 DCLUTs

The definition of a single DCLUT for use with 4 colour DRCS (ICT 2/2 2/0) shall be executed (see Annex A Part 5 Section 3.1)

5.2.3 Resolution

A Select Unit Resolution (SUR) of 4 for the colour map shall be executed (see Annex A Part 5 Section 3.1).

A Select Unit Resolution (SUR) of 5 for the DCLUT for use with 4 colour DRCS shall be executed (see Annex A Part 5 Section 3.1).

5.2.4 Reset

Part 6 Define FORMAT

6.1 Coding

All codings of Define FORMAT shall be recognised.

6.2 Format and Wrap-around

6.2.1 Simple

A format of 24 rows of 40 columns shall be presented with automatic wrap-around.

6.2.2 Extended

A format of 20 rows (US 2/13 4/2) of 40 columns shall be presented (see Annex A Part 6 Section 2.0).

The wraparound ON and OFF commands (see Annex A Part 6 Section 2.0) shall be executed.

Part 7 Transparent Data

Conformance to Transparent Data is defined in T/CD 06-03.

Part 8 Reset

All reset sequences shall be recognised (see Annex A Part 8). All those which affect the implemented display modes shall be executed.

Part 9 Processable Data

Conformance to Processable Data is defined in T/CD 06-04.

Part 10 Terminal Facility Identifier

Conformance to the Terminal Facility Identifier is defined in T/CD 06-05.

Part 11 Timing Control

All timing control shall be executed (see Annex A Part 11).

Annex C to Recommendation T/TE 06-01 (formerly T/CD 06-01)

Note 1: This annex is an integral part of the recommendation.
Note 2: All references to T/CD should be interpreted as T/TE.

CEPT

VIDEOTEX SERVICE REFERENCE MODEL : PROFILES

Issue 6, October 1988
(A Revision of Issue 5, Edinburgh, May 1988)

VIDEOTEX SERVICE REFERENCE MODEL : PROFILES

CONTENTS

ANNEX C

CEPT Videotex Service Reference Model : Profiles

RECOGNISED PROFILES

The following profiles are recognised by CEPT for existing Videotex services.

1. Profile 1

This is the profile including the first horizon (see Fig 1 of recommendation). It uses 8 bit coding and satisfies the following parts of the conformance requirements described in Annex B:

Part 0 General

Part 1 Alpha-mosaic Displays (8 bit coding)

Part 4 Define DRCS (except 4.2.2)

Part 5 Define Colour

Part 6 Define Format

Part 8 Reset

Part 10 Terminal Facility Identifier (refer to T/CD 06-05)

2. Profile 2

This is the profile of a service which implements only parallel attribute controls and extended format effectors.

It uses 7 bit coding and satisfies the following parts of the conformance requirements described in Annex B:

Part 1 Alpha-mosaic displays

The following paragraphs only:

1.1.1 **Simple alpha-numeric characters**

1.1.2 **Extended alpha-numeric characters**

The alpha-numeric repertoire should be recognised. Wherever a particular graphic character cannot be presented exactly, a fallback presentation shall be shown instead. The fallback presentation should, by preference, be an approximation of the intended graphic.

1.2.1 **Simple mosaic and other characters**

1.3 Format effectors

1.4.1 Parallel attribute controls

Notes: 1. Background colour controls, start lining and stop lining require a space when used with alpha-numeric characters.

2. Start Box and End Box require a space.

3. Double Height and Double Size controls cannot be used on adjacent rows.

1.4.6.1 Implicit scrolling of the whole screen

1.5 Device controls

1.6 Coding structure -7 bit coding

1.7 Invocation of character sets

1.8 Designation of Greek Character Sets (for terminals with a Greek character capability)

Part 6 Format and wraparound

The following paragraph only:

6.2.1 Simple format and wrap-around

3. Profile 3

This is the profile of a service which implements only serial attribute controls and simple format effectors.

It uses 7 bit coding and satisfies the following parts of the conformance requirements described in Annex B:

Part 1 Alpha-mosaic displays.

The following paragraphs only:

1.1.1 Simple alpha-numeric characters

1.2.1 Simple mosaic and other characters

1.3.1 Simple format effectors

1.4.2 Serial attribute controls (excluding Stop Conceal)

Note: Attribute controls usually require a space.

1.5 Device controls

1.6 Coding structure - 7 bit coding

1.7 Invocation of character sets

1.8 Designation of Greek Character Sets (for terminals with a Greek character capability)

Part 6 Define Format

The following paragraph only:

6.2.1 Simple format and wrap-around

4. Profile 4

This is the profile of a service which implements only serial attribute controls and extended format effectors. It uses 7 bit coding and satisfies the following part of the conformance requirements described in Annex B:

Part 1 Alpha-mosaic displays

The following paragraphs only:

1.1.1 Simple alpha-numeric characters

1.2.1 Simple mosaic and other characters

1.3 Format effectors

1.4.2 Serial attribute controls (excluding Stop Conceal)

Note: Attribute controls usually require a space.

1.5 Device controls

1.6 Coding structure - 7 bit coding

1.7 Invocation of character sets

1.8 Designation of Greek Character Sets (for terminals with a Greek character capability)

Part 6 Define Format

The following paragraph only:

6.2.1 Simple Format and wrap-around.

5. Switching between Videotex Profiles

Switching to a given profile is made effective when receiving the sequence ESC 2/5 4/4 <profile> 4/0, where <profile> is a parameter indicating which profile is to be taken into account.

<profile> identifier:

- either a single profile within a display mode,
- or a combination of profiles, one and only one per display mode.

In the alphamosaic display mode, the following values are used:

6/0 alphamosaic profile 1
6/1 alphamosaic profile 2
6/2 alphamosaic profile 3
6/3 alphamosaic profile 4

In the geometric display mode, the following values are used:

6/8 geometric profile x1
6/9 geometric profile x2

In the ASCII display mode, the following values are used:

7/14 x/y as specified in Recommendation T/TE 06-05 (TFI).

The following restricting rules apply to the use of the switching sequence:

- the switching command is recognised only inside an alphamosaic VPDE.
- the switching command must contain one and only one alphamosaic or ASCII profile. This is the default profile after the switching command.

The profile selection is terminated:

- either by selection of another profile environment,
- or by following the rules of ISO 2022 (section 5).

Note: When the Profile switching mechanisms is executed no assumption can be made about the subsequent contents of the screen.

History

Document history	
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