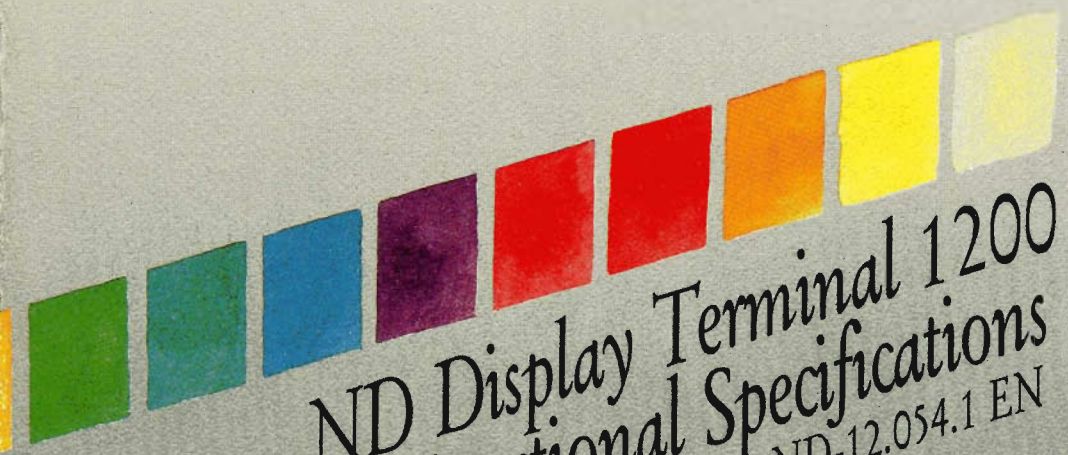

ND Display Terminal 1200 Functional Specifications

ND-12.054.1 EN

Norsk Data

ND Display Terminal 1200 Functional Specifications

ND-12.054.1 EN

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 Version 1 June 1988

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The product

This manual describes the ND Display Terminal 1200 with product number ND 110140.

The manual

The manual describes the functional specifications for the terminal. It gives a description of the terminal modes, the control functions and the device control strings. In addition there is a chapter describing the compatibility with the terminal TDV 2115.

This manual is written on basis of the alpha emulator version 3.03, and graphic emulator version 3.01.

The reader

This manual is written for system programmers and advanced users of the terminal.

Related manuals

ND Display Terminal 1200 Operator Guide, ND-12.045.

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CHAPTER 1 DEVICE CONCEPTS AND TERMINOLOGY

1.1 Parameter error

A parameter error occurs when inconsistent or meaningless parameters are specified with a sequence. The parameter error internal flag will be set, and may be interrogated with a DSR with private parameter "request error status".

1.2 Work area

The work area is the rectangle defined by the upper, lower, left and right margins. The default work area is the whole screen.

The work area can be used to restrict the cursor movements and to perform scrolling inside a rectangle while the rest of the screen remains static.

1.3 Cursor boundary

The cursor boundary depends on the setting of the Origin Mode switch.

If the 'Origin Mode' switch is set to screen, the cursor boundary will be the whole screen.

If the 'Origin Mode' switch is set to work area, the cursor boundary will be the work area only.

CHAPTER 2 SPECIFICATIONS FOR THE ND DISPLAY TERMINAL 1200

The specifications for the ND Display Terminal 1200 are based on the following international standards:

ISO 646 7-bit coded character set for information process interchange.

ISO 2022 Information processing, ISO 7-bit and 8-bit coded character sets and code extension techniques.

ISO 6429 Information processing, ISO 7-bit and 8-bit coded character sets, additional control functions for character, and imaging devices.

2.1 C0 Control codes

Hex	Mnemonic		Interpretation
<00>	NUL		Null
<07>	BEL		Bell
<08>	BS		Backspace
<09>	HT		Horizontal tab
<0A>	LF		Line feed
<0B>	VT		Line feed
<0C>	FF		Clear screen
<0D>	CR		Cursor return
<0E>	SO		Shift out
<0F>	SI		Shift in
<11>	DC1	XON	Transmission on
<13>	DC3	XOFF	Transmission off
<1B>	ESC		Escape

2.2 Three character escape sequences

Sequence	Mnemonic	Interpretation
ESC # <23> 3 <33>	NDDHLT	Double height line - top
ESC # <23> 4 <34>	NDDHLB	Double height line - bottom
ESC # <23> 5 <35>	NDSWL	Single width line
ESC # <23> 6 <36>	NDDWL	Double width line
ESC (<28> -	-	Designate G0 character set
ESC) <29> -	-	Designate G1 character set

2.3 ND private escape sequences

Sequence	Mnemonic	Interpretation
ESC 0 <30>		
ESC 1 <31>	NDSS1	Single shift to alternative character set 1
ESC 2 <32>	NDSS2	Single shift to alternative character set 2
ESC 3 <33>	NDSS3	Single shift to alternative character set 3
ESC 4 <34>	NDSS4	Single shift to alternative character set 4
ESC 5 <35>	NDSS5	Single shift to alternative character set 5
ESC 6 <36>	NDSS6	Single shift to alternative character set 6
ESC 7 <37>	NDSC	Save cursor
ESC 8 <38>	NDRC	Restore cursor
ESC 9 <39>	NDSS7	Single shift to alternative character set 7
ESC : <3A>	NDSS8	Single shift to alternative character set 8
ESC ; <3B>	NDSS9	Single shift to alternative character set 9
ESC = <3D>	NDEAKM	Enter alternate keypad mode
ESC > <3E>	NDXAKM	Exit alternate keypad mode

2.4 C1 set

Sequence	Mnemonic	Interpretation
ESC D <44>	IND	Index
ESC E <45>	NEL	Newline
ESC H <48>	HTS	Horizontal tab set
ESC M <4D>	RI	Reverse index
ESC N <4E>	SS2	Single shift 2
ESC O <4F>	SS3	Single shift 3
ESC P <50>	DCS	Device control string
ESC [<5B>	CSI	Control sequence introducer
ESC \ <5C>	ST	String terminator (is only used in connection with DCS)

2.5 Control functions represented by ESC Fs sequences

Sequence	Mnemonic	Interpretation
ESC c <63>	RIS	Reset to initial state
ESC n <6E>	LS2	Locking shift 2
ESC o <6F>	LS3	Locking shift 3

2.6 CSI sequences

n :numeric character, ASCII coded 1 - 255
l :numeric character, ASCII coded 1 - <number of lines>
c :numeric character, ASCII coded 1 - <number of columns>
s :special parameter, ASCII coded values as specified
ms :multiple selective parameters separated by semicolon

Sequence			Mnemonic	Interpretation
CSI n	@	<40>	ICH	Insert character
CSI n	A	<41>	CUU	Cursor up
CSI n	B	<42>	CUD	Cursor down
CSI n	C	<43>	CUF	Cursor forward
CSI n	D	<44>	CUB	Cursor backward
CSI n	E	<45>	CNL	Cursor next line
CSI n	F	<46>	CPL	Cursor previous line
CSI n	G	<47>	CHA	Cursor horizontal absolute
CSI l;c	H	<48>	CUP	Cursor position
CSI n	I	<49>	CHT	Cursor horizontal tabulation
CSI s	J	<4A>	ED	Erase in display
CSI s	K	<4B>	EL	Erase in line
CSI n	L	<4C>	IL	Insert line
CSI n	M	<4D>	DL	Delete line
CSI n	P	<50>	DCH	Delete character
CSI s	Q	<51>	SEE	Set editing extent
CSI l;c	R	<52>	CPR	Cursor position report
CSI n	S	<53>	SU	Scroll up
CSI n	T	<54>	SD	Scroll down
CSI s	W	<57>	CTC	Cursor tabulation control
CSI n	X	<58>	ECH	Erase character
CSI n	Z	<5A>	CBT	Cursor backward tabulation
CSI n	'	<60>	HPA	Interpreted as CHA
CSI n	a	<61>	HPR	Interpreted as CUF
CSI n	b	<62>	REP	Repeat
CSI s	c	<63>	DA	Device attribute
CSI n	d	<64>	VPA	Vertical position absolute
CSI n	e	<65>	VPR	Interpreted as CUD
CSI l;c	f	<66>	HVP	Interpreted as CUP
CSI s	g	<67>	TBC	Tab clear
CSI ms	h	<68>	SM	Set mode
CSI s	i	<69>	MC	Media copy
CSI c	j	<6A>	HPB	Interpreted as CUB
CSI l	k	<6B>	VPB	Interpreted as CUU
CSI ms	l	<6C>	RM	Reset mode
CSI ms	m	<6D>	SGR	Set graphic rendition
CSI s	n	<6E>	DSR	Device status report

2.7 CSI sequences with a single intermediate character

Sequence	Hex	Interpretation
CSI n <SP> @	<20> <40>	SL Scroll left
CSI n <SP> A	<20> <41>	SR Scroll right

2.8 ND private CSI sequences

Sequence		Hex	Mnemonic	Interpretation
CSI n;m	p	<70>	NDILWA	Insert lines in work area
CSI n;m	q	<71>	NDDLWA	Delete lines in work area
CSI n;m	r	<72>	NDSTBM	Set top and bottom margin
CSI n;m	s	<73>	NDICHE	Insert characters with extent
CSI n;m	t	<74>	NDDCHE	Delete characters with extent
CSI ms	u	<75>	NDSREC	Save rectangle
CSI ms	v	<76>	NDRREC	Restore rectangle
CSI s	w	<77>	NDSSKL	Set soft-key level
CSI ms	x	<78>	NDREQ	Request and report terminal parameters
CSI 2;s	y	<79>	NDTST	Invoke confidence test
CSI ms	z	<7A>	NDSAR	Set attribute in rectangle
CSI ms	{	<7B>	NDAAR	Add attribute in rectangle
CSI ms	|	<7C>	NDRAR	Remove attribute in rectangle
CSI ms	}	<7D>	NDFC	Fill character(s) in rectangle
CSI ms	~	<7E>	NDDWA	Define work area
CSI n/p		<7F>	NDVIDEO	Alpha video on/off

2.9 ND private CSI sequences with reserved p1

CSI < ms	Reserved
CSI = ms	Reserved
CSI > ms	Reserved

Sequence	Hex	Mnemonic	Interpretation
CSI ? ms A	<41>	NDCLED	Clear message LED(s)
CSI ? ms B	<42>	NDSLED	Set message LED(s)
CSI ? ms C	<43>	NDBLED	Blink message LED(s)

CHAPTER 3 THE SET UP FUNCTIONS

On the next page is a complete overview of the set-up functions of the ND Display Terminal 1200. To get into the set-up soft-key set, first press CTRL+ P8 (press and hold the CTRL key, then press P8), and then press P1.

3.1 Using the menus

Once you have entered the menu where you wish to make the adjustments, proceed as follows:

- Use the up- or down-arrow keys to move the cursor bar to the menu entry to be changed.
- Press carriage return or P8 (enter) and the set-up options for the current function are displayed as soft-key labels at the bottom of your screen. The current function value is identified with an asterisk (*). If you do not want to change anything, just press carriage return once more (or the up- or down-arrow key).
- Press the soft-key corresponding to the option you wish to select. The new value will be entered in the menu, but will be highlighted with an asterisk (*) until it is stored or the original value is restored.
- You may now return to the application you are working on (press P1) to test the new setting. If it seems ok, go back to the menu and press P5 (STORE VALUES) to store the new value. If you want the old value back, press P4 (RESTORE VALUES).

- After you have made all the changes in the menu, press P1 (exit) until you return to the set-up soft-key set.

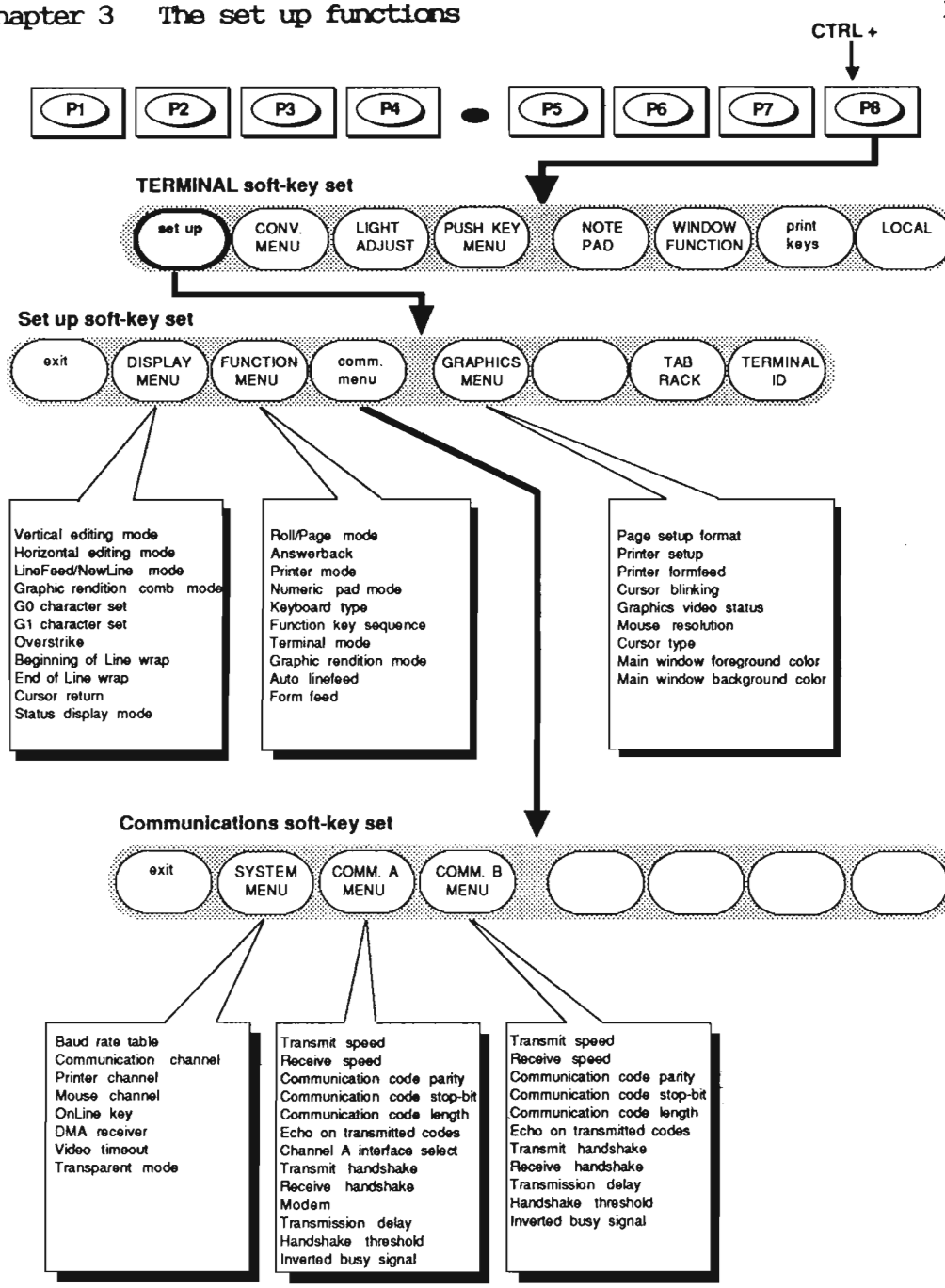


Figure 1. Set-up functions overview

3.2 Exit (P1)

Exit (on P1) will bring you out of the set-up level, and up to the level you entered when you pressed CTRL+P8.

3.3 The display menu

If you press P2 (DISPLAY MENU), you will get the display menu on the screen. In the following, we will explain all the entries in this menu.

Vertical editing mode

This menu entry has two options *Following* and *Preceding*. Although it will not have any practical influence on the NOTIS software it should be set to *Following*, which is the default.

Following Insertion of a line will cause the line with the cursor, and the lines below, to move down one line. If a line is deleted, the lines below will move up one line.

Preceding Insertion of a line will cause the line with the cursor, and the lines above, to move up one line. If a line is deleted, the lines above will move down one line.

Horizontal editing mode

This menu entry has two options *Following* and *Preceding*. It will not have any practical influence on the NOTIS software, but it should be set to *Following*, which is the default.

Following Insertion of a character will cause the rest of the characters in the text to move forward one place. Deletion of a character will cause the rest of the characters to move one place backward.

Preceding Insertion of a character will cause the characters prior to the insertion point to move one place backward. Deletion of a character will cause the characters prior to the insertion point to move one place forward.

> Note
>
> Insertion and deletion of characters also depends on the editing extent, set through the SEE control function (see page 92).

LineFeed/NewLine mode

This menu entry has two options *LF* (LineFeed) and *NEL* (NewLine). This function should always be set to *LF*.

LF The interpretation of line feed causes the cursor to move to the same position of the next line.

NEL The interpretation of line feed causes the cursor to move to the first position of the next line.

Graphic rendition comb mode

This menu entry has two options, *Replacing* and *Cumulative*. *Replacing* is default, and ND software demands Replacing.

Replacing Each occurrence of the control function SGR (Select Graphic Rendition) cancels the effect of any preceding occurrence. Any graphic rendition aspects that are to remain unchanged after an occurrence of SGR will be re-specified by that SGR.

Cumulative Each occurrence of the control function SGR causes only those graphic rendition aspects to be changed that are specified by that SGR. All other graphic rendition aspects remain unchanged.

G0 and G1 character sets

By selecting this menu entry, you can choose the character set you will use on the ND Display Terminal 1200. The character sets are related to the languages listed in the function key labels displayed on the bottom of your screen. If you press P8, (- more -), another set of languages will come up. Pressing it once more will bring you back to the first set.

See appendix A for the whole range of characters that ND is supporting for the ND Display Terminal 1200.

The G0 character set is the ASCII values from 32 to 127, and G1 the ASCII values from 150 to 256. ND software uses only the G0 set.

Note

Also the language mode can be set in the Function menu, under Keyboard type.

Overstrike

This function is not used by ND. The menu entry has two options, *Enabled* and *Disabled*. *Disabled* is default. It should be set to *Disabled*.

Beginning of line wrap

This menu entry has two options, *Stop* and *Wrap*. *Stop* is default. This function has no effect on ND software.

Stop A movement which could have extended beyond the beginning of the line will have no effect.

Wrap A movement which extends beyond the beginning of the line will cause the cursor to wrap around to the preceding line.

End of line wrap

This menu entry has two options, *Stop* and *Wrap*. *Wrap* is default. It has no practical effect on the NOTIS software.

Wrap When the cursor comes to the end of one line, it will automatically jump to the first position on the next line, and continue from there.

Stop The cursor will not jump to the next line, but remain on the last position on the line until a carriage return/line feed is written.

Cursor return

This menu entry has two options, *CR* (Cursor Return) and *NEL* (NewLine). *CR* is default. This function should be set to *CR*.

CR When carriage return is pressed, the cursor moves to the first position on the same line.

NEL When carriage return is pressed, the cursor moves to the first position on the line below.

Status display mode

This menu entry has two options, *Normal* and *Full*. *Normal* is default. By choosing normal or full, you decide how much information you want to have in the bottom part of the screen, underneath the horizontal line.

3.4 The function menu

If you press P3 (FUNCTION MENU) when you are in the set-up level, you will get the function menu on the screen. We will describe the menu entries one by one.

Roll/Page mode

This entry has two options, *Roll* and *Page*. It has no practical effect on the NOTIS software. *Roll* is default.

Roll If the cursor is moved beyond the last line of the screen, a buffer roll-up is generated.

Page If moving the cursor beyond the last line of the screen is attempted, the cursor will remain on the last line, and the screen will not roll.

Answerback

This function is not used by ND. It is normally *NONE*.

Printer mode

This entry has two options, *Local/Remote* and *Remote*. *Local/Remote* is default.

Local/Remote A local printout can be initiated from the terminal by pressing the PRINT key or by receiving a signal (Media Copy) from the host computer.

Remote Printouts can only be initiated from the host computer by using the MC sequence. When the PRINT key is pressed, an MC sequence will be transmitted to the host computer and no local action will be taken.

Numeric pad mode

This menu entry determines the function of the white numeric keys on the right side of the keyboard. It has two options, *Numeric* and *Function*. This function should normally be set to *Numeric*.

Numeric In this mode, the numeric keys are numeric keys.

Function In this mode, the numeric keys will act as function keys. This is used by some ND software; for example, in NOTIS-WP as User Definable Keys (UDKs).

Keyboard type

This menu entry lets you choose the keyboard nationality for your ND Display Terminal 1200. The layout of the keyboard is related to the nationalities listed in the function key labels on the bottom of your screen. If you press P8, *- more -*, another set of nationalities will appear. Pressing it again will bring back the first set.

> **Note**
>
> Also set language in the Display menu, under G0 and G1 character sets.

Keyboard nationality and character set nationality (G0) can be set independently, but in most cases they should be set to the same nationality.

Function key sequence

This menu entry defines the format of the function key sequences. It may be utilized by future ND software. It should always be set to *ISO*.

Terminal mode

This menu entry has two options, *2115* and *NATIVE*. *Native* is default. *2115* can be used with applications that are written for the 2115 terminal, without use of VTM tables.

Graphic rendition mode

This menu entry has two options, *Attribute* and *Underline*. *Attribute* is default. It has effect only when in 2115 mode, and controls the way in which the graphic rendition of characters on the screen can be selected.

Attribute

Each change in graphic rendition is initiated by a so-called attribute. This attribute occupies one character position on the screen, and it is invisible. The graphic rendition specified by an attribute is valid up to the next attribute, or to the end of the screen.

If an attribute is erased or overwritten, the graphic rendition for the characters following the removed attribute will be the same as for the character preceding the removed attribute.

Attributes are set by the code sequence SO y SI, where y is selected according to the following table:

bit:	6	5	4	3	2	1	0	
	y	y	y	x	x	x	x	
	0	0	0					Control character
	0	0	1					Control character
	0	1	0					Low intensity
	0	1	1					Blink
	1	0	0					Inverse video
	1	0	1					Underline
	1	1	0					Invisible
	1	1	1					Normal

Underline

The characters can be individually underlined, and this is controlled by the SO <0E> and SI <0F> codes. Switching from normal to underline is done by SO, and back to normal by SI.

Auto linefeed

Auto linefeed has two options, *Off* and *On*. *On* is default.

On

Each printed line is terminated with carriage return and line feed, CR LF.

Off

Each printed line is terminated with carriage return, CR.

Form feed

This menu entry has four options, *None*, *After*, *Before*, and *After & Before*. *None* is default. This function will cause the local printer to feed one sheet of paper, according to the option selected.

None No paper feed will take place.

After One sheet of paper will be fed after printing is finished.

Before One sheet of paper will be fed before printing starts.

After & Before A sheet of paper will be fed before printing and another sheet will be fed after printing.

3.5 The communication menu

Pressing P4 (comm. menu) in the set-up soft key set generates a new set of communication soft keys: *SYSTEM MENU* the *COMM. A MENU* and the *COMM. B MENU*.

3.5.1 The system menu

Pressing P2 (SYSTEM MENU) will allow you to alter the general system parameters for the terminal.

Baud rate table

There are two baud rate tables, *Table 1* and *Table 2*. *Table 2* is default. There are different baud-rate selections in the two tables. You must use one or the other. It is not possible to combine baud rates from both tables. The two tables contain the following baud rates:

Table 1. Baud rate tables 1 and 2

Baud rate	Table 1	Table 2	Baud rate	Table 1	Table 2
50	x		600	x	x
75		x	1200	x	x
110	x	x	2400	x	x
134.5	x	x	4800	x	x
150		x	9600	x	x
200	x		19200		x
300	x	x	38400	x	

Communication channel

There are two communication channels, *Channel A* and *Channel B*. *Channel B* is default. Both have serial interfaces. *Channel A* is always V.24 (RS-232-C). *Channel B* is normally current loop but can also be used for other protocols, such as V.11 and RS-232-C. Each channel has a separate plug. For the location of the plugs, see the manual ND Display Terminal 1200 User Guide, ND-12.045, part 1. *Channel A* has full modem support.

The parameters can be set individually for each channel. To do this, you must return to the communication soft-key set and press P3 or P4, depending on the channel you wish to adjust.

Printer channel

There are three options *None*, *Channel A* and *Channel B*. *None* is default. If a printer is connected, the switch is normally set to channel A, and the printer is connected to the port marked "Internal line A". This is a V.24/RS-232-C interface.

Mouse channel

There are three options *None*, *Channel A* and *Channel B*. *None* is default. If the graphics option is installed, and a mouse is connected, the switch should normally be set to *Channel A*. This depends, however, on the configuration of the terminal.

On line key

There are two options *Online* and *Toggle*. *Toggle* is default.

Online The terminal is always online.

Toggle The terminal can be switched offline.

DMA receiver

There are three options *Off*, *Channel A* and *Channel B*. *Off* is default.

This function selects the built-in Direct Memory Access (DMA) feature for receiving characters. This feature should be used on the host channel if high speed communication is required. Note that the use of this feature disables the Transmit handshake (i.e. the host can stop the terminal).

Video timeout

The options are *On* or *Off*. *On* is default.

When this function is on, the video signal to the screen will be switched off approximately 10 minutes after the last action on the terminal. This will lengthen the lifetime of the screen considerably, so it is advisable to have this function on. Pressing any key restores the screen picture.

Transparent mode

This can be either *Disabled* or *Enabled*. *Disabled* is default.

Disabled This is the normal operation of the screen.

Enabled All the sequences and codes for the screen will be displayed, but not executed. This function is normally used only when debugging a program, in order to see what is sent to the screen.

3.5.2 The COMM. A MENU

This menu allows you to set and alter the parameters for communication channel A.

Transmit speed/Receive speed

Initially these are both set to *9600 Baud*. To see the other possible baud rates, press P8 (enter). You will the see the four highest baud rates. To see the seven lowest, press P8, (- more -). If the speed you want is not available, go to the *SYSTEM MENU*, select *Baud rate table*, and change to the other baud rate table. Then return here and see if you can find the appropriate baud rate.

Communication code parity

The options are *None*, *Even*, *Odd*, *Mark* and *Space*. The initial setting is *Even*.

Communication code stop-bit(s)

You can set either *1* or *2* stop bits. 1 bit is set initially.

Communication code length

The code length can be either *7* or *8 bits*. *7 bits* is the initial setting.

Echo on transmitted codes

The echo can be *External*, *Internal* or *Loopback*. *External* is set initially, and is always used on ND systems.

Channel A interface select

The interface select can be either *External* or *Internal*. *Internal* is set initially. In which slot the interfaces are mounted, depends to a certain degree on the configuration of the terminal. Most often the lowest slot will be the V.24 (RS-232-C) interface. If an optional interface adapter is mounted, it will probably be in the second lowermost slot, this will be *External*.

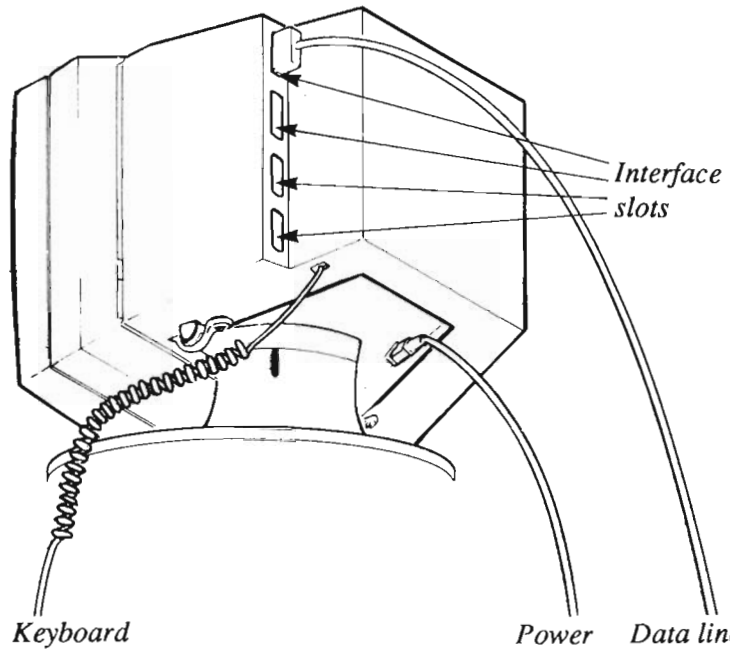


Figure 2. Location of the interface slots

Handshake on transmit

This can be either *None*, *XON/XOFF* or *CTS/DSR*. *None* is set initially.

This function selects the type of handshake on the transmission line, i.e. determines how the host can start/stop transmission from the terminal.

If the function is set to *None*, the handshake is disabled and the host cannot interfere with the transmission from the terminal.

> **Note**
>
> XON/XOFF is ignored when the terminal is in 2115 mode, and when the terminal is set to relay printing mode.

Handshake on Receive

This can be either *None*, *XON/XOFF* or *DTR*. *XON/XOFF* is set initially.

This function selects the handshake type on the receiving line, i.e. determines how the terminal can start/stop transmission from the host.

If the switch is set to *None*, the handshake is disabledand the terminal cannot interfere with the transmission from the host.

Modem

The modem function can be set to *Inhibit*, *Leased* or *Dialled*. *Inhibit* is the initial setting.

Transmission delay

This can be set to *None*, *20 ms*, *40 ms* or *60 ms*. *None* is set initially. Transmission delay is the time the terminal waits until it sends a character to the host computer. If this time is increased, the host computer will have more time to receive data from the terminal. Try to increase the transmission delay if you get "wild" characters on the screen.

Handshake threshold

The options are *1/16 buffer*, *1/8 buffer* or *1/4 buffer*. *1/4 buffer* is set initially. *1/4 buffer* should always be used on ND systems.

This indicates how much is left in the input buffer in the terminal when an XOFF is sent to the host computer.

Inverted busy signal

The options are *No* or *Yes*. *No* is set initially.

This switch can be used in cases where the terminal is connected to a device that has the logical levels of the busy signal inverted.

3.5.3 The COMM. B MENU

The COMM. B MENU is identical to the COMM. A MENU, except for the menu entries *Channel A interface select* and *Modem* which are not present in this menu.

3.6 The graphics menu

> **Note**
>
> This menu will be functional only if the graphic option is installed in the terminal

From the set-up soft-key level, press P5 (GRAPHICS MENU) to get the graphics set up menu on the screen.

Page setup format

This menu entry has four selections, *Screen*, *Rotated screen*, *Portrait* and *Landscape*. With this menu entry you can define the format of the printout from the graphics bitmap. This choice may depend on the size of the sheet of paper you are using. The initial setting is *Screen*.

Screen Any graphics printout will be a hardcopy of the whole screen as you see it.

Rotated screen Any graphics printout will be a hardcopy of the whole screen as you see it, but it will be rotated 90 degrees on the sheet of paper.

Portrait Any graphics printout will be a hardcopy of the whole graphics page in memory (or as much as you can print on a sheet of paper). Usually the page is bigger than the size of the screen (default is 1024 x 1024 pixels).

Landscape Any graphics printout will be a hardcopy of the whole graphics page in memory (or as much as you can print on a sheet of paper), but it wil be rotated 90 degrees on the sheet of paper. Usually the page is bigger than the size of the screen (default is 1024 x 1024 pixels).

Printer setup

This menu entry lets you set one of two local printers, *Epson* or *PT88*. This depends on which printer you have connected directly to the terminal. Remember that we are not talking about the printer or printers connected to the host computer, but the one (if any) connected to your

terminal as a local printer.

Epson is a Epson LX-86 matrix printer, ND 110090. PT88 is an inkjet printer, ND 110079. Both printers have serial interface.

Printer formfeed

This menu entry defines whether the printer should eject one empty sheet of paper before or after printing. *None* is set initially.

None No formfeed before or after printing.

Before One blank sheet of paper is ejected before printing starts.

After One blank sheet of paper is ejected after printing.

Before & after One blank sheet of paper is ejected before printing and one after.

Cursor blinking

The cursor blinking can be either *On* or *Off*. The initial setting is *Off*.

Graphics video status

The graphics video status can be either *On* or *Off*. The initial setting is *On*. This function describes whether the graphics should be visible or not when you are working in alpha modus.

On The graphics will be visible even if you are switching to alpha modus.

Off The graphics will disappear from the screen when you are switching to alpha modus, and will become visible again when you are returning to graphics modus.

Mouse resolution

The mouse resolution can be *Low* or *High*. *Low* is set initially.

This function describes the relation between the movement of the mouse and the corresponding movement of the cursor on the screen.

Cursor type

The graphics cursor can be *Tracking Cross* or *Crosshair*. *Crosshair* is set initially. Some applications will, however, override this setting.

Main window foreground and background color

These two menu entries allow you to set the foreground and background color for the main graphics window. The selections are *Light Grey*, *Dark Grey*, *Black* and *White*. *Black* is set initially for the foreground color, and *Light Grey* for the background color.

3.7 Tab rack

If you press P7 (TAB RACK) when you are in set-up level, it is possible to edit the terminal's tab rack. These tabs will have no effect on the tabs in NOTIS applications.

3.8 Terminal ID

Press P8 (TERMINAL ID) when in set-up level and you will have the terminal identification. This will give you the revision number of the terminal emulator.

CHAPTER 4 DESCRIPTION OF TERMINAL MODES

4.1 KAM - Keyboard Action Mode

SET MODE: The keyboard is enabled.

RESET MODE: The keyboard is disabled.

4.2 IRM - Insert/Replace Mode

SET MODE: INSERT - Characters written to the screen will be inserted at the cursor position.

RESET MODE: REPLACE - Characters written to the screen will replace the previous characters.

4.3 HEM - Horizontal Editing Mode

SET MODE: PRECEDING - A character insertion causes the cursor position and the preceding positions to be shifted backward; a character deletion causes the characters preceding the cursor position to be shifted forward.

RESET MODE: FOLLOWING - A character insertion causes the cursor position and the following positions to be shifted forward; a character deletion causes the characters following the cursor position to be shifted backward.

4.4 VEM - Vertical Editing Mode

SET MODE: FOLLOWING - A line insertion causes the contents of the cursor line and the following lines to be shifted up; a line deletion causes the contents of the lines following the cursor line to be shifted down.

RESET MODE: PRECEDING - A line insertion causes the contents of the cursor line and the following lines to be shifted down; a line deletion causes the contents of the lines following the cursor line to be shifted up.

4.5 SRM - Send/Receive Mode (echo mode)

RESET MODE: MONITOR - Data which are locally entered are immediately displayed.

SET MODE: SIMULTANEOUS - Local echo is disabled; only data which is sent to the terminal is displayed.

4.6 LNM - LineFeed/NewLine Mode

SET MODE: LF implies only vertical movement of the cursor.

RESET MODE: LF is interpreted as NEL.

4.7 GRCM - Graphic Rendition Combination Mode

SET MODE: Each occurrence of the control function SELECT GRAPHIC RENDITION (SGR) cancels the effect of any preceding occurrence.

RESET MODE: Each occurrence of the control function SELECT GRAPHIC RENDITION (SGR) causes only those graphic rendition aspects to be changed that are specified by that SGR. All other graphic rendition aspects remain unchanged.

4.8 NDOM - Origin Mode

SET MODE: Origin will be at the upper left corner of the work area. Line and column numbers are therefore relative to the current setting of the work area. The cursor may not be positioned outside the work area.

RESET MODE: Origin will be at the upper left character position on the screen. Line and column numbers are therefore independent of the current setting of the work area. The cursor may be positioned outside the margins.

4.9 NDSSM - Smooth Scroll Mode

SET MODE: Scrolling will be smooth.

RESET MODE: Scrolling will be performed as an instantaneous jump.

4.10 NDBLWM - Beginning of Line Wrap Mode

SET MODE: Cursor will wrap around to preceding line when left margin is reached.

RESET MODE: Cursor will stop at left margin.

4.11 NDELWM - End of Line Wrap Mode

SET MODE: Cursor will wrap around to next line when right margin is reached.

RESET MODE: Cursor will stop at right margin.

4.12 NDSPM - Scroll/Page Mode

SET MODE: Rolling is disabled.

RESET MODE: Rolling is enabled.

4.13 NDCRM - Cursor Return Mode

SET MODE: CR will move the cursor to the beginning of the next line.

RESET MODE: CR will move the cursor to the beginning of the current line.

4.14 NDDM - Display Mode

SET MODE: Display will be set to positive image.

RESET MODE: Display will be set to negative image.

4.15 NDKKM - Key Klick Mode

SET MODE: Key click will be enabled.

RESET MODE: Key click will be disabled.

4.16 NDCKM - Cursor Key Character Mode

FUNCTION: This is an ND private parameter which is applicable to set mode and reset mode control sequences. It will normally send the ISO sequences, but can also send VT100 sequences (<ESC> O and the letters p through y). This applies only to native mode. If the terminal is in the 2115 mode, it will send only the 2115 sequences. See chapter 7, Function key sequences, on page 107.

4.17 NDAWM - Autowrap Mode

FUNCTION: This is an ND private parameter applicable to set mode and reset mode control sequences. The reset state causes any displayable characters received when the cursor is at the right margin to replace the previous character there. The set state causes these characters to advance to the start of the next line, and do a scroll up if required and permitted.

4.18 NDARM - Auto Repeat Mode

FUNCTION: This is an ND private parameter applicable to set-mode and reset-mode control sequences. The reset state causes no keyboard keys to autorepeat. The set state causes certain keyboard keys to autorepeat.

CHAPTER 5 DEFINITION OF CONTROL FUNCTIONS

The control functions and definitions are listed alphabetically for easy reference.

5.1 BEL - Bell

HEX CODE: 07

FUNCTION: The terminal bell is sounded. Can be disabled from the CONVENIENCE MENU.

CURSOR ACTION: None

ERROR HANDLING: None

5.2 BS - Backspace

HEX CODE: 08

FUNCTION: The cursor is moved one character position backwards. If the cursor is in the first column it will remain static or move to the last position on the previous line, depending on the Beginning of Line Wrap switch. If the cursor is in the home position, it will remain static.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: See above

ERROR HANDLING: See above

SEE ALSO: LF, IND, RI, CUB, CUF, CUU, CUD

5.3 CBT - Cursor Backward Tabulation

HEX SEQUENCE: <CSI> n 5A

ASCII SEQUENCE: <CSI> n Z

DIRECTION: Host to terminal

DEFAULT: 1

FUNCTION: The cursor is moved to the *n-th* preceding horizontal tab stop.

PARAMETERS: One numeric parameter.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: See above

ERROR HANDLING: If there are no more tab stops to the left of the current cursor position within the cursor boundary, the sequence is ignored and a parameter error occurs.

SEE ALSO: CHT, CTC

5.4 CHA - Cursor Horizontal Absolute

HEX SEQUENCE: <CSI> n 47

ASCII SEQUENCE: <CSI> n G

DIRECTION: Host to terminal

DEFAULT: Beginning of line

FUNCTION: The cursor is moved to the *n-th* position on the current line.

PARAMETERS: One numeric parameter specifying the column.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: See above

ERROR HANDLING: If the specified cursor position is beyond the right cursor boundary, a parameter error occurs, and the function is ignored.

SEE ALSO: CUP

5.5 CHT - Cursor Horizontal Tabulation

HEX SEQUENCE: <CSI> n 49

ASCII SEQUENCE: <CSI> n I

DIRECTION: Host to terminal

DEFAULT: 1

FUNCTION: The cursor is moved to the *n-th* following horizontal tab stop.

PARAMETERS: One numeric parameter.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: See above

ERROR HANDLING: If there are no more tab stops to the right of the current cursor position within the cursor boundary, the sequence is ignored and a parameter error occurs.

SEE ALSO: CBT, CTC

5.6 CNL - Cursor Next Line

HEX SEQUENCE: <CSI> n 45

ASCII SEQUENCE: <CSI> n E

DIRECTION: Host to terminal

DEFAULT: 1

FUNCTION: Cursor position is moved to the first column of the *n-th* following line.

PARAMETERS: One numeric parameter.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: See above

ERROR HANDLING: If the new line is outside the vertical cursor boundary, the cursor will stop when it reaches the last line of the screen or work area.

SEE ALSO: CPL

5.7 CPL - Cursor Previous Line

HEX SEQUENCE: <CSI> n 46

ASCII SEQUENCE: <CSI> n F

DIRECTION: Host to terminal

DEFAULT: 1

FUNCTION: Cursor position is moved to the first column of the *n-th* preceding line.

PARAMETERS: One numeric parameter.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: See above

ERROR HANDLING: If the new line is outside the current vertical cursor boundary, the sequence is ignored.

SEE ALSO: CPL

5.8 CPR - Cursor Position Report

HEX SEQUENCE: <CSI> 1 3B c 52

ASCII SEQUENCE: <CSI> 1 ; c R

DIRECTION: Terminal to host

DEFAULT: 1, 1

FUNCTION: Reports the current cursor position. CPR is solicited by a DSR.

PARAMETERS: Two numeric parameters - current line followed by current column.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: See above

ERROR HANDLING: None

SEE ALSO: DSR

5.9 CR - Cursor Return

HEX CODE: 0D

FUNCTION: Depending on the 'Cursor Return' switch, CR moves the cursor position to position 1 of the current line or of the next line.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: See above

ERROR HANDLING: If the cursor is on the last line within the cursor boundary, the action taken depends on the 'Scroll/Page mode' switch.

If scroll mode is set, the cursor will remain on the last line and the screen or work area will be scrolled.

If page mode is set, CR is ignored, and a parameter error occurs.

5.10 CSI - Control Sequence Introducer

HEX SEQUENCE: 1B 5B (7-bit mode)
9B (8-bit mode)

ASCII SEQUENCE: <ESC> (7-bit mode)
<CSI> (8-bit mode)

DIRECTION: Host to terminal and terminal to host

FUNCTION: CSI is the first character of a control sequence.

CURSOR ACTION: None

ERROR HANDLING: None

5.11 CTC - Cursor Tabulation Control

HEX SEQUENCE: <CSI> s 57

ASCII SEQUENCE: <CSI> s W

DIRECTION: Host to terminal

DEFAULT: 0

FUNCTION: CTC causes one or more tabulation stops to be set or cleared, depending on the parameter value.

PARAMETERS: Selective parameter:

0: Set a horizontal tab stop at the current cursor position
1: Ignored
2: Clear the horizontal tab stop at the current cursor position.
3: Ignored
4: Clear all horizontal tab stops.
5: Clear all horizontal tab stops.
6: Ignored

CURSOR ACTION: None

ERROR HANDLING: For undefined parameters, the sequence is ignored and a parameter error occurs.

Note that attempting to clear nonexistent tab stops does not cause a parameter error.

SEE ALSO: CHT, CBT

5.12 CUB - Cursor Backward

HEX SEQUENCE: <CSI> n 44

ASCII SEQUENCE: <CSI> n D

DIRECTION: Host to terminal

DEFAULT: 1 position

FUNCTION: The cursor position is moved to the *n-th* preceding character position.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

PARAMETERS: One numeric parameter.

CURSOR ACTION: See above

ERROR HANDLING: If the new position is beyond the left margin, the cursor will wrap to the previous line if BOL is set to wrap.

SEE ALSO: CUF, CUU, CUD

5.13 CUD - Cursor Down

HEX SEQUENCE: <CSI> n 42

ASCII SEQUENCE: <CSI> n B

DIRECTION: Host to terminal

DEFAULT: 1 line

FUNCTION: The cursor position is moved to the *n-th* following line.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

PARAMETERS: One numeric parameter

CURSOR ACTION: See above

ERROR HANDLING: If the new line is outside the lower cursor boundary, the cursor will stop on the last line.

SEE ALSO: CUF, CUB, CUU

5.14 CUF - Cursor Forward

HEX SEQUENCE: <CSI> n 43

ASCII SEQUENCE: <CSI> n C

DIRECTION: Host to terminal

DEFAULT: 1 position

FUNCTION: The cursor position is moved to the *n-th* following character position.

If the new position is beyond the right margin, the 'End Of Line Wrap' switch determines if the the cursor will wrap around to the previous line or move to the first position of the current line.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

PARAMETERS: One numeric parameter.

CURSOR ACTION: See above

ERROR HANDLING: If the new position is beyond the right margin, the 'End Of Line Wrap' switch determines the action taken:

- If the switch is set to WRAP, the cursor will wrap around to the next line.
- If the switch is set to STOP, the cursor will stop at the right margin.

SEE ALSO: CUB

5.15 CUP - Cursor Position

HEX SEQUENCE: <CSI> 1 3B c 48

ASCII SEQUENCE: <CSI> 1 ; c H

DIRECTION: Host to terminal

DEFAULT: line 1, position 1

FUNCTION: The cursor is positioned at line l, column c.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

If the 'Origin Mode' switch is set to off, the coordinates must be within the number of lines and columns on the screen. If the 'Origin Mode' switch is set to on, the coordinates must be within the number of lines and columns in the current work area.

PARAMETERS: Two numeric parameters - line number followed by column.

CURSOR ACTION: See above

ERROR HANDLING: If the new cursor position is outside the current cursor boundary, a parameter error occurs, and the sequence is ignored.

SEE ALSO: CHA, VPA

5.16 CUU - Cursor Up

HEX SEQUENCE: <CSI> n 41

ASCII SEQUENCE: <CSI> n A

DIRECTION: Host to terminal

DEFAULT: 1 line

FUNCTION: The cursor position is moved to the *n-th* preceding line.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

PARAMETERS: One numeric parameter.

CURSOR ACTION: See above

ERROR HANDLING: If the new position is beyond the first line within the cursor boundary, the cursor stops at the upper margin.

SEE ALSO: CUD, CUB, CUF

5.17 DA - Device Attribute

HEX SEQUENCE: <CSI> s 63

ASCII SEQUENCE: <CSI> s c

DIRECTION: Host to terminal and terminal to host

DEFAULT: 0

FUNCTION: DA is used to request and report terminal identity.

If the parameter value is 0 <30>, DA is used to solicit an identifying DA from the terminal.

With a parameter value not equal to 0 <30>, DA identifies the terminal.

PARAMETERS: Selective parameters:

0: Request DA from terminal
1..64: Response from the terminal identifying the number of screen pages installed. This parameter will always be 1 in an ND installation.

CURSOR ACTION: None

ERROR HANDLING: If the parameter is not equal to 0 in a request to the terminal, the sequence is ignored and a parameter error occurs.

SEE ALSO: DSR

5.18 DC1/DC3 - XON/XOFF - Transmission on & off

HEX CODE: 11 (XON)
13 (XOFF)

FUNCTION: XOFF is used by either the host computer or terminal to identify that an overrun condition may occur if more data is transmitted.

XON is used to inform that the terminal or host is ready to accept more data.

XON/XOFF protocol can be enabled or disabled separately in each direction from the terminal set up menus.

CURSOR ACTION: None

ERROR HANDLING: None

5.19 DCH - Delete Character

HEX SEQUENCE: <CSI> n 50

ASCII SEQUENCE: <CSI> n P

DIRECTION: Host to terminal

DEFAULT: 1

FUNCTION: The contents of the cursor position and, depending on the setting of the 'Horizontal Editing Mode' switch, the contents of the *n-1* following or preceding characters are removed. The contents of the adjacent string of character

positions are shifted towards the cursor position. At the other end of the shifted part, *n* character positions are erased.

PARAMETERS: One numeric parameter specifying the number of characters to be deleted

CURSOR ACTION: None

ERROR HANDLING: If the *n-1* position is outside the cursor boundary and the range defined by the 'Set Editing Extent' function, the function is ignored.

SEE ALSO: ICH, SEE

5.20 DCS - Device Control String

HEX SEQUENCE: 1B 50 (7-bit mode)
90 (8-bit mode)

ASCII SEQUENCE: <ESC> P (7-bit mode)
<DCS> (8-bit mode)

DIRECTION: Host to terminal and terminal to host

DEFAULT: -

FUNCTION: This is the opening delimiter of a device control string. The control string must be terminated with ST (string terminator).

PARAMETERS: This sequence is used to control:

- Program key loading

- LED control (included for historical reasons)
  <DCS> L nm <ST>

  where *n* is lamp number and *m*=0 means lamp off, *m*=1 means lamp on, *m*=2 means lamp blink.

- Messages displayed on the status line
- Card reader.

CURSOR ACTION: None

ERROR HANDLING: None

SEE ALSO: ST

5.21 DL - Delete Line

HEX SEQUENCE: <CSI> *n* 4D

ASCII SEQUENCE: <CSI> n M

DIRECTION: Host to terminal

DEFAULT: 1 line

FUNCTION: The contents of the current line and, depending on the setting of the 'Vertical Editing Mode' switch, the contents of the *n-1* preceding or following lines are deleted. The contents of a number of adjacent lines are shifted towards the current line. At the other end of the shifted part, *n* lines are erased.

If the current work area is defined to be less than the whole screen, the following rules apply:

- If the 'Origin Mode' switch is set to on, only the character positions that reside within the work area are affected. Character positions outside the work area remain static.
- If the 'Origin Mode' switch is set to off, the whole screen is affected.

PARAMETERS: One numeric parameter defining the number of lines to be deleted.

CURSOR ACTION: None

ERROR HANDLING: If *n* specifies more lines than available within the cursor boundary, the sequence is ignored and a parameter error occurs.

SEE ALSO: IL, NDDLWA

5.22 DSR - Device Status Report

HEX SEQUENCE: <CSI> s 6E

ASCII SEQUENCE: <CSI> s n

DIRECTION: Host to terminal and terminal to host

DEFAULT: 0

FUNCTION: DSR either reports the status of the sending device or requests a status report from the receiving device, depending on the parameter value.

PARAMETERS: Selective parameters

0: Ignored
1: Ignored
2: Ignored
3: Ignored
4: Ignored
5: Ignored
6: A report in the form of a CPR is requested.

CURSOR ACTION: None

ERROR HANDLING: For undefined parameters the sequence is ignored and a parameter error occurs.

SEE ALSO: DA

5.23 ECH - Erase Character

HEX SEQUENCE: <CSI> n 58

ASCII SEQUENCE: <CSI> n X

DIRECTION: Host to terminal

DEFAULT: 1

FUNCTION: The cursor position and the *n-1* following character positions are erased.

PARAMETERS: One numeric parameter defining the number of characters to be erased.

CURSOR ACTION: None

ERROR HANDLING: If the cursor position plus *n-1* positions go beyond the cursor boundary, as many characters as possible are erased and a parameter error occurs.

SEE ALSO: ICH, DA

5.24 ED - Erase in Display

HEX SEQUENCE: <CSI> n 4A

ASCII SEQUENCE: <CSI> n J

DIRECTION: Host to terminal

DEFAULT: 0

FUNCTION: Some or all positions of the screen are erased, depending on the parameter value.

If the 'Origin Mode' switch is set to on, this function will only work within the limits of the current work area. If the 'Origin Mode' switch is off, the function will operate on the whole screen.

PARAMETERS: One numeric parameter:

0: The cursor position and the character positions up to the end of the screen or work area are erased.

1: The character positions from the beginning of the page or work area and up to and including the cursor position are erased.

2: All character positions of the page or work area are erased.

CURSOR ACTION: None

ERROR HANDLING: For undefined parameters the sequence is ignored, and a parameter error occurs.

SEE ALSO: EL

5.25 EL - Erase in Line

HEX SEQUENCE: <CSI> n 4B

ASCII SEQUENCE:
<CSI> n K

DIRECTION: Host to terminal

DEFAULT: 0

FUNCTION: Some or all positions of the current line are erased, depending on the parameter value.

If the 'Origin Mode' switch is set to on, this function will only work within the limits of the right and left margin. If the 'Origin Mode' switch is off, the function will operate on the whole line.

PARAMETERS: One numeric parameter:

0: The cursor position and the character positions up to the end of the line or to the right margin are erased.

1: The character positions from the beginning of the line or from the left margin and up to and including the cursor position are erased.

2: All character positions on the line or between the right and left margins, are erased.

CURSOR ACTION: None

ERROR HANDLING: For undefined parameters the sequence is ignored, and a parameter error occurs.

5.26 ESC - Escape

HEX CODE: 1B

FUNCTION: The ESC code is a sequence introducer and must be followed by one or more codes to have effect.

If the code that is received after the ESC code is invalid, both the ESC code and the code received after the ESC code will be ignored.

CURSOR ACTION: None

ERROR HANDLING: As above

5.27 FF - Form Feed

HEX CODE: 0C

FUNCTION: The action taken when FF is received depends on the setting of the 'Origin Mode' switch:

- If 'Origin Mode' is set to off, the whole screen is cleared.
- If 'Origin Mode' is set to on, only the work area is cleared.

CURSOR ACTION: Moved to home position

ERROR HANDLING: None

SEE ALSO: ED

5.28 HT - Horizontal Tabulation

HEX CODE: 09

ASCII CODE: <HT>

DIRECTION: Host to terminal and terminal to host

DEFAULT: None

FUNCTION: Move cursor to the next horizontal tab position.

Note that tab positions are defined as absolute positions and do not depend on the definition of the work area.

PARAMETERS: None

CURSOR ACTION: See above

ERROR HANDLING: It there are no more tab positions to the right of the cursor within the cursor boundary, the cursor is moved to the right margin.

SEE ALSO: HTS, CTC, CBT, TBC

5.29 HTS - Horizontal Tabulation Set

HEX SEQUENCE:	1B	48	(7-bit mode)
	88		(8-bit mode)
ASCII SEQUENCE:	<ESC>	H	(7-bit mode)
	<HTS>		(8-bit mode)

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: A tab-stop is set in the tabulation rack at a position corresponding to the current horizontal cursor position. Note that tab positions are defined as absolute positions and do not depend on the definition of the work area.

PARAMETERS: None

CURSOR ACTION: None

ERROR HANDLING: None

5.30 ICH - Insert Character

HEX SEQUENCE: <CSI> n 40

ASCII SEQUENCE: <CSI> n @

DIRECTION: Host to terminal

DEFAULT: 1

FUNCTION: Insert *n* blank characters at the cursor position and, depending on the 'Horizontal Editing Mode' switch, into the *n-1* preceding or following character positions. The previous contents of these positions are shifted away from the cursor position. The contents of *n* character positions at the other end ofthe shifted part are removed.

The extent of the shifted part depends on the setting of the 'Origin Mode' switch and the extent established by Select Editing Extent (SEE).

PARAMETERS: One numeric parameter defining the number of blanks to be inserted.

CURSOR ACTION: None

ERROR HANDLING: If there is not enough space for the characters to be inserted within the editing extent, the sequence is ignored and an error condition occurs.

SEE ALSO: DCH

5.31 IL - Insert Line

HEX SEQUENCE: <CSI> n 4C

ASCII SEQUENCE: <CSI> n L

DIRECTION: Host to terminal

DEFAULT: 1 line

FUNCTION: IL prepares for the insertion of *n* lines by erasing the current line and, depending on the setting of the 'Vertical Editing Mode' switch, the *n-1* preceding or following lines. The previous contents of the erased lines are shifted away from the current line. The contents of *n* lines at the other end of the shifted part are removed.

If the current work area is defined to be less than the whole screen the following rules apply:

- If the 'Origin Mode' switch is set to on, only the character positions that reside within the work area are affected. Character positions outside the work area remain static.
- If the 'Origin Mode' switch is set to off, the whole screen is affected.

PARAMETERS: One numeric parameter defining the number of lines to be inserted.

CURSOR ACTION: None

ERROR HANDLING: If there is not enough room within the cursor boundary to insert the specified number of lines, an error condition occurs and the function is ignored.

SEE ALSO: DL

5.32 IND - Index

HEX SEQUENCE:
1B 44 (7-bit mode)
84 (8-bit mode)

ASCII SEQUENCE:
<ESC> D (7-bit mode)
<IND> (8-bit mode)

DIRECTION: Host to terminal

FUNCTION: The cursor is moved to the same character position on the next line.

PARAMETERS: None

CURSOR ACTION: See above

ERROR HANDLING: If the cursor is on the last line on the screen or work area, the action taken depends on the 'Scroll/Page mode' switch:

- If scroll mode is set, the work area or screen will scroll up.
- If page mode is set, the sequence is ignored and a parameter error occurs.

SEE ALSO: RI, NEL, LF

5.33 LF - Line Feed

HEX CODE: 0A

FUNCTION: This code depends on the setting of the LF switch:

- If the 'Line Feed' switch is set to LF, the cursor will be moved to the corresponding position on the next line.
- If the 'Line Feed' switch is set to NEL, the cursor will be moved to the first position on the next line.

CURSOR ACTION: See above

ERROR HANDLING: If the cursor is on the last line within the cursor boundary, the action taken depends on the 'Scroll/Page mode' switch:

- If scroll mode is set, the work area or screen will scroll.
- If page mode is set, the sequence is ignored, and a parameter error occurs.

SEE ALSO: IND

5.34 LS2/LS3 - Locking Shift 2/3

HEX SEQUENCE:
1B 6E (LS2 7-bit mode)
8E (LS2 8-bit mode)
1B 6F (LS3 7-bit mode)
8F (LS3 8-bit mode)

ASCII SEQUENCE:
<ESC> n (LS2 7-bit mode)
<LS2> (LS2 8-bit mode)
<ESC> o (LS3 7-bit mode)
<LS3> (LS3 8-bit mode)

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: This function is not used by ND but is included to ensure compatibility. The detailed function will not be described here, but can be found in the standards ISO 2022 - 1988.

PARAMETERS: None

CURSOR ACTION: None

ERROR HANDLING: None

SEE ALSO: SS2/SS3

5.35 MC - Media Copy

HEX SEQUENCE: <CSI> s 69

ASCII SEQUENCE: <CSI> s i

DIRECTION: Host to terminal

DEFAULT: 0

FUNCTION: MC controls the transfer of data from or to the printer port.

PARAMETERS: One selective parameter:

0: The contents of the screen are transferred to the printer. If the 'Origin Mode' switch is set, only the work area is printed.
1: Ignored
2: Ignored
3: Ignored
4: Relay printing is aborted
5: Relay printing starts. Data from line is sent to printer port without affecting the screen, and data from keyboard or printer port is sent to host. Keyboard input may be disabled with the SM sequence.

ND private parameters with intermediate character '>':

>4: Turn LOG print-mode off
>5: Turn LOG print-mode on

CURSOR ACTION: None

ERROR HANDLING: For undefined parameters, the sequence is ignored, and a parameter error occurs.

5.36 NDAAR - Add Attribute to Rectangle

(ND private function)

HEX SEQUENCE: <CSI> 11 3B c1 3B 12 3B c2 3B a1 3B ....an 7B

ASCII SEQUENCE: <CSI> 11 ; c1 ; 12 ; c2 ; a1 ; ....an {

DIRECTION: Host to terminal

DEFAULT: Full screen or whole work area

FUNCTION: NDAAR is a format effector which specifies that one or more graphic rendition aspects shall be added to a rectangle. Previously specified aspects within the rectangle shall remain in effect.

PARAMETERS: *11*, *c1* and *12*, *c2* specifies the coordinates of the upper left and lower right corner of the rectangle respectively. *a1* ... an specifies the attributes - see SGR on page 93.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: None

ERROR HANDLING: *l2* must be greater than or equal to *l1*, and *c2* greater than orequal to *c1*. Otherwise the sequence is ignored and a parameter error occurs.

SEE ALSO: NDRAR, NDSAR

5.37 NDBLED - Blink Message LED(s)

HEX SEQUENCE: <CSI> 3F n1 3B n2 43

ASCII SEQUENCE: <CSI> ? n1 ; n2 C

DIRECTION: Host to terminal

DEFAULT: 0

FUNCTION: Blink the message lamps according to parameters.

PARAMETERS:

0: Clear all lamps
1: Blink lamp 1 (EXPAND)
2: Blink lamp 2 (APPEND)
3: Blink lamp 3 (BUSY)
4: Blink lamp 4 (MESSAGE)

CURSOR ACTION: None

ERROR HANDLING: Undefined parameters are ignored, and a parameter error occurs.

SEE ALSO: NDCLED, NDSLED

5.38 NDCLED - Clear Message LED(s)

HEX SEQUENCE: <CSI> 3F n1 3B n2 41

ASCII SEQUENCE: <CSI> ? n1 ; n2 .... A

DIRECTION: Host to terminal

DEFAULT: 0

FUNCTION: Clear the message lamps according to parameters.

PARAMETERS:
0: Clear all lamps
1: Clear lamp 1 (EXPAND)
2: Clear lamp 2 (APPEND)
3: Clear lamp 3 (BUSY)
4: Clear lamp 4 (MESSAGE)

CURSOR ACTION: None

ERROR HANDLING: Undefined parameters are ignored, and a parameter error occurs.

SEE ALSO: NDBLED, NDSLED

5.39 NDDCHE - Delete Characters with Extent

HEX SEQUENCE: <CSI> n 3B m 74

ASCII SEQUENCE: <CSI> n ; m t

DIRECTION: Host to terminal

DEFAULT: Delete one character at cursor position with extent set to right cursor boundary.

FUNCTION: NDDCHE deletes *n* characters on the current line starting at the current cursor position. The following characters up to column *m* are shifted towards the cursor.

PARAMETERS: Two numeric parameters defining the number of characters to be inserted and the extent of the shifted part.

CURSOR ACTION: None

ERROR HANDLING: If *n* or *m* have meaningless values, the sequence is ignored and a parameter error occurs.

SEE ALSO: NDICHE

5.40 NDDLWA - Delete Lines in Work Area

HEX SEQUENCE: <CSI> n 3B m 71

ASCII SEQUENCE: <CSI> n ; m q

DIRECTION: Host to terminal

DEFAULT: Delete first line in work area.

FUNCTION: NDDLWA deletes *n* lines in the work area starting at line *m* in the work area. Depending on the setting of the 'Vertical Editing Mode' switch, the lines are deleted either above or below the starting point.

NDDLWA affects only the part of a line that resides within the work area.

PARAMETERS: Two numeric parameters defining the number of lines to be deleted, and the start point given as a relative position from the top of the work area.

CURSOR ACTION: None

ERROR HANDLING: If *n* specifies more lines than available within the current work area, the sequence is ignored and a parameter error occurs.

SEE ALSO: DL

5.41 NDDWA - Define Work Area

HEX SEQUENCE: <CSI> 11 3B c1 3B 12 3B c2 7E

ASCII SEQUENCE: <CSI> 11 ; c1 ; 12 ; c2 ~

DIRECTION: Host to terminal

DEFAULT: The entire screen

FUNCTION: NDDWA defines the rectangle that is limited by *l1*, *c1*, *l2* and *c2* to be the current work area.

If the 'Origin Mode' switch is set to on, the upper left corner of the work area becomes the home position with coordinates 1,1 and all other screen coordinates are relative to the home position. In this mode, the cursor cannot be placed outside the work area and all screen operations are restricted to work within the work area.

PARAMETERS: *l1*, *c1* and *l2*, *c2* specifies the coordinates of the upperleft and lower right corner of the rectangle respectively.

CURSOR ACTION: Cursor will be placed in the home position.

ERROR HANDLING: *l2* must be greater than or equal to *l1*, and *c2* greater than orequal to *c1*. Otherwise the sequence is ignored and a parameter error occurs.

5.42 NDDWL - Double Width Line

HEX SEQUENCE: 1B 23 36

ASCII SEQUENCE: <ESC> # 6

DIRECTION: Host to terminal

Default None

FUNCTION: This sequence causes the current line to become double width. Only the left half of the line can be displayed in this fashion, and characters in the right half will disappear. If the current line is already double width the sequence is ignored.

PARAMETERS: None

CURSOR ACTION: The cursor will remain at the same character position unless the previous cursor position is shifted outside the screen. In this case, the cursor is positioned at the last character position on the line.

ERROR HANDLING: None

SEE ALSO: NDSWL

5.43 NDFC - Fill Character(s) in Rectangle

HEX SEQUENCE: <CSI> 11 3B c1 3B 12 3B c2 3B a1 3B ....an 7D

ASCII SEQUENCE: <CSI> 11 ; c1 ; 12 ; c2 ; a1 ; ....an }

DIRECTION: Host to terminal

DEFAULT: Fill the current work area with space.

FUNCTION: NDFC is a sequence to fill the rectangle defined by *l1, c1, l2*and *c2* with a character or a string of characters. The string of characters is restricted to the current G0 and G1 set and may not exceed 10 characters.

PARAMETERS: *l1, c1* and *l2, c2* specifies the coordinates of the upperleft and lower right corner of the rectangle respectively.

CURSOR ACTION: None

ERROR HANDLING: *l2* must be greater than or equal to *l1*, and *c2* greater than orequal to *c1*. Otherwise the sequence is ignored and a parameter error occurs.

5.44 NDICHE - Insert Characters with Extent

HEX SEQUENCE: <CSI> n 3B m 73

ASCII SEQUENCE: <CSI> n ; m s

DIRECTION: Host to terminal

DEFAULT: Insert one character at cursor position with extent set to right cursor boundary.

FUNCTION: NDICHE inserts *n* characters on the current line starting at the current cursor position. The following characters up to column *m* are shifted away from the cursor.

PARAMETERS: Two numeric parameters defining the number of characters to be inserted and the extent of the shifted part.

CURSOR ACTION: None

ERROR HANDLING: If *n* or *m* have meaningless values, the sequence is ignored, and a parameter error occurs.

SEE ALSO: NDDCHE

5.45 NDILWA - Insert Lines in Work Area

HEX SEQUENCE: <CSI> n 3B m 70

ASCII SEQUENCE: <CSI> n ; m p

DIRECTION: Host to terminal

DEFAULT: Insert one line at the top of the work area.

FUNCTION: NDILWA inserts *n* lines in the work area starting at line *m* in the work area. Depending on the setting of the 'Vertical Editing Mode' switch, the lines are inserted either above or below the starting point.

NDILWA affects only the part of a line that resides within the work area.

PARAMETERS: Two numeric parameters defining the number of lines to be inserted and the position of the first line given as an offset from the beginning of the work area.

CURSOR ACTION: None

ERROR HANDLING: If *n* specifies more lines than available within the current work area, the sequence is ignored, and a parameter error occurs.

SEE ALSO: IL

5.46 NDRAR - Remove Attribute in Rectangle

HEX SEQUENCE: <CSI> l1 3B c1 3B l2 3B c2 3B a1 3B ....an 7C

ASCII SEQUENCE: <CSI> l1 ; c1 ; l2 ; c2 ; a1 ; ....an @

DIRECTION: Host to terminal

DEFAULT: Full screen or whole work area.

FUNCTION: NDRAR is a format effector which specifies that one or more graphic rendition aspects shall be removed from a rectangle.

PARAMETERS: *l1*, *c1* and *l2*, *c2* specifies the coordinates of the upper left and lower right corner of the rectangle respectively. *a1* ... an specifies the attributes - see SGR on page 93.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: None

ERROR HANDLING: *l2* must be greater than or equal to *l1*, and *c2* greater than orequal to *c1*. Otherwise the sequence is ignored and a parameter error occurs.

SEE ALSO: NDSAR, NDAAR

5.47 NDRC - Restore Cursor

HEX SEQUENCE: 1B 38

ASCII SEQUENCE: <ESC> 8

DIRECTION: Host to terminal

DEFAULT: If the cursor position is not previously saved, the defaults are:

- Origin mode - OFF
- Graphic rendition - NORMAL
- Cursor position - upper left corner

FUNCTION: NDRC causes the cursor position, graphic rendition and 'Origin Mode' switch setting previously saved with NDSC to be recalled.

PARAMETERS: None

CURSOR ACTION: See above

ERROR HANDLING: None

SEE ALSO: NDSC

5.48 NDREQ - Request and Report Terminal Parameters

HEX SEQUENCE:
<CSI> s 78 (Request)
<CSI> s 3B n1 3B ... nn 78 (Response)

ASCII SEQUENCE:
<CSI> s x (Request)
<CSI> s ; n1 ; ... nn x (Response)

DIRECTION: Host to terminal and terminal to host

DEFAULT: Request report type 1

FUNCTION: NDREQ is used to request and report the setting of various terminal switches and menu options.

PARAMETERS: Selective parameters. The first parameter specifies the report type.

Request

0: Ignored
1: Request report type 1 - Emulator level
2: Request report type 2 - Mode switches
3: Request report type 3 - Convenience options
4: Request report type 4 - Graphic switches
5: Request report type 5 - Error conditions
6: Request report type 6 - Auxiliary devices

Report

0: Requested report type not available

1:Report type..: Emulator type/level
Report format: n=emulator type (3 digits in the range 050 - 100)

2:Report type..: Mode switches
Report format: The three parameters (p1, p2, p3) give status for the switches dependent of the SM/RM functions. p1 gives ISO switches, p2 gives DEC-compatible switches and p3 gives ND private switches.

p1:
Bit 0: Keyboard action mode
Bit 1: Insert/replace mode
Bit 2: Vertical editing mode
Bit 3: Horizontal editing mode
Bit 4: Send/receive mode
Bit 5: Line feed - new line
Bit 6: SGR combination mode
Bit 7: -

p2:
Bit 0: Cursor key mode
Bit 1: Smooth scroll mode
Bit 2: Screen background mode
Bit 3: Origin mode
Bit 4: Autowrap mode
Bit 5: Auto repeat mode, 1
Bit 6: Auto repeat mode, 2
Bit 7: -

p3:
Bit 0: Beginning of line wrap mode
Bit 1: Roll/page mode
Bit 2: Key klick mode
Bit 3: PUSH-key label mode
Bit 4: PROGRAM-key label mode
Bit 5: Decimal separator mode, 1
Bit 6: Decimal separator mode, 2
Bit 7: Numeric pad mode

3:Report type..: Convenience options
Report format: Two parameters (p1 and p2) gives convenience switches that are not listed in report 2.

```
        p1:         Bit 0: Cursor type
                    Bit 1: Cursor blink
                    Bit 2: Key rollover
                    Bit 3: Margin bell
                    Bit 4: Caps lock at power on
                    Bit 5: Shift lock key action, 1
                    Bit 6: Shift lock key action, 2
                    Bit 7: -

        p2:         Bit 0: Menu language
                    Bit 1: -
                    Bit 2: -
                    Bit 3: -
                    Bit 4: -
                    Bit 5: -
                    Bit 6: -
                    Bit 7: -

4:Report type..:  Graphic switches
  Report format:  To be defined later

5:Report type..:  Error conditions
  Report format:
        p1:         Bit 0: Framing error
                    Bit 1: Parity error
                    Bit 2: Line buffer overflow
                    Bit 3: -
                    Bit 4: -
                    Bit 5: -
                    Bit 6: Cursor addressing error
                    Bit 7: CSI parameter error
```

6:Report type..: Auxiliary devices
Report format: The parameter p1 gives available options.

p1: Bit 0: MCR - Magnetic Card Reader
Bit 1: Graphics
Bit 2: Mouse
Bit 3: Printer connected
Bit 4: -
Bit 5: -
Bit 6: -
Bit 7: -

CURSOR ACTION: None

5.49 NDRREC - Restore Rectangle

HEX SEQUENCE: <CSI> n 76

ASCII SEQUENCE: <CSI> n v

DIRECTION: Host to terminal and terminal to host

DEFAULT: Restore and clear rectangle

FUNCTION: A previously saved rectangle is recalled to the same absolute position on the screen with characters and graphic rendition.

If requested, the terminal responds with the status of the operation.

PARAMETERS: One numeric parameter:

0: Recall request sent to terminal: restore and clear rectangle. Response will be sent.
1: Recall request sent to terminal: restore rectangle without clearing it. Response will be sent.
2: Recall request sent to terminal: restore and clear rectangle. Response will not be sent.
3: Recall request sent to terminal: restore rectangle without clearing it. Response will not be sent.

8: Confirmation to host: rectangle restored.
9: Error response to host: rectangle not previously saved - terminal may have been reset.

CURSOR ACTION: None

ERROR HANDLING: For undefined parameters, the sequence is ignored and a parameter error occurs.

SEE ALSO: NDSREC

5.50 NDSAR - Set Attribute in Rectangle

HEX SEQUENCE: <CSI> 11 3B c1 3B 12 3B c2 3B a1 3B ....an 7A

ASCII SEQUENCE: <CSI> 11 ; c1 ; 12 ; c2 ; a1 ; ....an z

DIRECTION: Host to terminal

DEFAULT: Full screen or whole work area. Normal attribute.

FUNCTION: NDSAR is a format effector which specifies that one or more graphic rendition aspects shall be set in a rectangle. Previously specified aspects within the rectangle shall be reset.

PARAMETERS: *11*, *c1* and *12*, *c2* specifies the coordinates of the upper left and lower right corner of the rectangle respectively. *a1* ... an specifies the attributes - see SGR on page 93.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: None

ERROR HANDLING: *l2* must be greater than or equal to *l1*, and *c2* greater than orequal to *c1*. Otherwise the sequence is ignored and a parameter error occurs.

SEE ALSO: NDAAR, NDRAR

5.51 NDSC - Save Cursor

HEX SEQUENCE: 1B 37

ASCII SEQUENCE: <ESC> 7

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: NDSC causes the current cursor position, graphic rendition and 'Origin Mode' switch setting to be saved.

PARAMETERS: None

CURSOR ACTION: None

ERROR HANDLING: None

SEE ALSO: NDRC

5.52 NDSLED - Set Message LED(s)

HEX SEQUENCE: <CSI> 3F n1 3B n2 42

ASCII SEQUENCE: <CSI> ? n1 ; n2 .... B

DIRECTION: Host to terminal

DEFAULT: 0

FUNCTION: Light the message lamps according to parameters.

PARAMETERS: 0: Clear all lamps
1: Light lamp 1 (EXPAND)
2: Light lamp 2 (APPEND)
3: Light lamp 3 (BUSY)
4: Light lamp 4 (MESSAGE)

CURSOR ACTION: None

ERROR HANDLING: For undefined parameters, the sequence is ignored and a parameter error occurs.

SEE ALSO: NDBLED, NDCLED

5.53 NDSREC - Save Rectangle

HEX SEQUENCE: <CSI> l1 3B c1 3B l2 3B c2 75

ASCII SEQUENCE: <CSI> l1 ; c1 ; l2 ; c2 u

DIRECTION: Host to terminal

DEFAULT: The entire screen or work area (depending on 'Origin Mode' switch).

FUNCTION: Save characters and graphic rendition of the rectangle defined by *l1, c1, l2* and *c2*. These may later be recalled to the same position on the screen with NDRREC

PARAMETERS: *l1, c1* and *l2, c2* specifies the coordinates of the upperleft and lower right corner of the rectangle respectively.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

CURSOR ACTION: None

ERROR HANDLING: *l2* must be greater than or equal to *l1*, and *c2* greater than orequal to *c1*. Otherwise the sequence is ignored and a parameter error occurs.

SEE ALSO: NDRREC

5.54 NDSS1-9 - Single Shift to Character Sets 1 through 9

HEX SEQUENCE:
1B 31 - NDSS1
1B 32 - NDSS2
1B 33 - NDSS3
1B 34 - NDSS4
1B 35 - NDSS5
1B 36 - NDSS6
1B 39 - NDSS7
1B 3A - NDSS8
1B 3B - NDSS9

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: NDSS1 ... NDSS9 specifies which of the alternate character sets 1 - 9 will be used for the following single character. The following character must have a bit combination in the range 21 to 7E.

PARAMETERS: None

CURSOR ACTION: None

ERROR HANDLING: None

5.55 NDSSKL - Set Soft-Key Level

HEX SEQUENCE: <CSI> s 77

ASCII SEQUENCE: <CSI> s w

DIRECTION: Host to terminal

DEFAULT: 1

FUNCTION: NDSSKL sets the level of the eight soft keys.

PARAMETERS:
1: PUSH-key level
2: PROGRAM-key level
3: TERMINAL-key level
4: PUSH-key level - suppress labels
5: PROGRAM-key level - suppress labels
6: TERMINAL-key level - suppress labels

CURSOR ACTION: None

ERROR HANDLING: If the value of s is meaningless, the sequence is ignored, and a parameter error occurs.

5.56 NDSTBM - Set Top and Bottom Margins

HEX SEQUENCE: <CSI> n 3B m 72

ASCII SEQUENCE: <CSI> n ; m r

DIRECTION: Host to terminal

DEFAULT: The entire screen

FUNCTION: NDSTBM is a sequence that defines the top and bottom margin of the work area; i.e., the number of lines at the top and bottom of the display that will remain static when scrolling occurs. The left margin will be set to column 1 and the right margin to column 80.

The cursor will be placed in the home position.

PARAMETERS: The first parameter is the line number of the first line in the scrolling region, and the second parameter is the line number of the last line in the scrolling region.

CURSOR ACTION: None

ERROR HANDLING: *m* must be greater than or equal to *n*. Otherwise the sequence is ignored and a parameter error occurs.

SEE ALSO: NDDWA

5.57 NDSWL - Single Width Line

HEX SEQUENCE: 1B 23 35

ASCII SEQUENCE: <ESC> # 5

DIRECTION: Host to terminal

FUNCTION: This sequence causes the current line to become single-width. If the current line is already a single-width, line the sequence is ignored.

CURSOR ACTION: None

ERROR HANDLING: None

SEE ALSO: NDDWL

5.58 NDTST - Invoke Confidence Test

HEX SEQUENCE: <CSI> 32 3B s 79

ASCII SEQUENCE: <CSI> 2 ; s y

DIRECTION: Host to terminal

DEFAULT: *s* = 0 (Reset to initial state)

FUNCTION: This sequence initiates various terminal tests according to the terminal parameters.

PARAMETERS: One selective parameter specifying the test to be executed:

0: Reset to initial state
1: Ignored
2: Ignored
10: Display all characters
11: Ignored
12: Display ND logo at cursor position

CURSOR ACTION : Depending on parameter.

ERROR HANDLING: For undefined parameters the sequence is ignored and a parameter error occurs.

5.59 NDVIDEO - Alpha Video on/off

HEX SEQUENCE: 7F

ASCII SEQUENCE: <CSI> n/p

DIRECTION: Host to terminal

DEFAULT: n=0

PARAMETERS: 0: Turn on alpha video
1: Turn off alpha video

5.60 NEL - Next Line

HEX SEQUENCE: 1B 45 (7-bit mode)
85 (8-bit mode)

ASCII SEQUENCE: <ESC> E (7-bit mode)
<NEL> (8-bit mode)

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: The cursor is moved to the first position of the next line.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

PARAMETERS: None

CURSOR ACTION: As above

ERROR HANDLING: If the cursor is on the last line within the cursor boundary, the action taken depends on the 'Scroll/Page mode' switch:

- If scroll mode is set, the cursor will remain last line and the screen or work area will scroll up.
- If page mode is set, NEL is ignored, and an error condition occurs.

SEE ALSO: LF

5.61 REP - Repeat

HEX SEQUENCE: <CSI> n 62

ASCII SEQUENCE: <CSI> n b

DIRECTION: Host to terminal

DEFAULT: 1 repetition

FUNCTION: This sequence indicates that the preceding character in the data stream, if it is a graphic character (represented by one or more bit combinations) including SPACE, is to be repeated *n* times.

PARAMETERS: One numeric parameter defining the number of repetitions.

CURSOR ACTION: The cursor is moved to the *n-th* following character position.

ERROR HANDLING: If *n* exceeds the number of character positions left within the cursor bounary, end-of-line wrapping and scrolling will be taken care of according to the setting of the relevant switches.

5.62 RI - Reverse Index

HEX SEQUENCE: 1B 4D (7-bit mode)
8D (8-bit mode)

ASCII SEQUENCE: <ESC> M (7-bit mode)
<RI> (8-bit mode)

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: The cursor is moved to the same character position on the previous line.

PARAMETERS: None

CURSOR ACTION: See above

ERROR HANDLING: If the cursor is on the first line within the cursor boundary, the action taken depends on the 'Scroll/Page Mode' switch:

- If scroll mode is set, the work area or screen will scroll down.
- If page mode is set, the sequence is ignored, and a parameter error occurs.

SEE ALSO: IND

5.63 RIS - Reset to Initial State

HEX SEQUENCE: 1B 63

ASCII SEQUENCE: <ESC> c

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: Reset terminal to the power-on state.

PARAMETERS: None

CURSOR ACTION: None

ERROR HANDLING: None

5.64 RM/SM - Reset/Set Mode

HEX SEQUENCE: <CSI> nl 3B ... nn 6C (Reset Mode)
<CSI> nl 3B ... nn 68 (Set Mode)

ASCII SEQUENCE: <CSI> nl ; ... nn l (Reset Mode)
<CSI> nl ; ... nn h (Set Mode)

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: RM and SM are used to respectively set and reset one or more terminal switches according to parameters.

PARAMETERS:

		Reset Mode	Set Mode
2:	Keyboard action mode	DISABLED	ENABLED
4:	Insert/replace mode	REPLACE	INSERT
7:	Vert. editing mode	FOLLOWING	PRECEDING
10:	Horiz. editing mode	FOLLOWING	PRECEDING
12:	Send/receive mode	MONITOR	SIMULTAN.
20:	Line feed - new line	NEL	LF
21:	SGR combination mode	REPLACING	CUMULATIVE
62:	Graphic Rendition mode	ATTRIBUTE	UNDERLINE
66:	2115 mode	2115 codes	N/A

NOTE

The 2115 mode and graphic rendition mode are included for historical reasons to enable the terminal to run 2115 compatible software. To exit from 2115 mode, the sequence 1B 51 must be sent.

DEC compatible private sequences with intermediate character '?':

HEX SEQUENCE: <CSI> 3F nl 3B ... nn 68 (Set Private Mode)
<CSI> 3F nl 3B ... nn 6C (Reset Private Mode)

ASCII SEQUENCE: <CSI> ? n1 ; ... nn h (Set Private Mode)
<CSI> ? n1 ; ... nn l (Reset Private Mode)

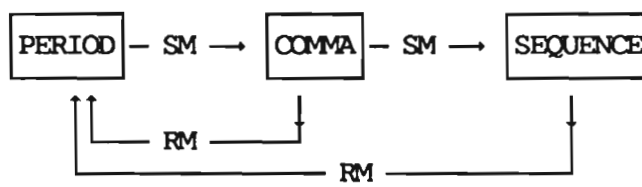
	Reset Mode	Set Mode
1: Cursor key mode	CURSOR	APPLICATION
2: Ignored		
3: Ignored		
4: Smooth scroll mode	STEP	SMOOTH
5: Screen background mode	NEGATIVE	POSITIVE
6: Origin mode	OFF	ON
7: Autowrap mode	STOP	WRAP
8: Auto repeat mode	OFF	REPEAT
9: Ignored		

ND private sequences with intermediate character '>':

HEX SEQUENCE: <CSI> 3E n1 3B ... nn 68 (Set Private Mode)
<CSI> 3E n1 3B ... nn 6C (Reset Private Mode)

ASCII SEQUENCE: <CSI> > n1 ; ... nn h (Set Private Mode)
<CSI> > n1 ; ... nn l (Reset Private Mode)

	Reset Mode	Set Mode
1: Beginning of line wrap mode	STOP	WRAP
2: End of line wrap mode	STOP	WRAP
3: Roll/page mode	ROLL	PAGE
4: Key click mode	DISABLE	ENABLE
5: PUSH-key label mode (labels ON/OFF)	ON	OFF
6: PROGRAM-key label mode (labels ON/OFF)	ON	OFF
7: Decimal-separator mode (PERIOD/COMMA/ SEQUENCE) See the drawing below.	PERIOD	COMMA/ SEQUENCE



CURSOR ACTION: None

ERROR HANDLING: For undefined parameters the sequences are ignored and a parameter error occurs.

5.65 SEE - Set Editing Extent

HEX SEQUENCE: <CSI> s 51

ASCII SEQUENCE: <CSI> s Q

DIRECTION: Host to terminal

DEFAULT: 0

FUNCTION: SEE establishes the editing extent for character insertion or deletion, depending on the parameter values.

PARAMETERS:
0: The shifted part consists of the entire page.
1: The shifted part consists of the active line.

ND private sequence with intermediate character '>':

HEX SEQUENCE: <CSI> 3E s 51

ASCII SEQUENCE: <CSI> > s Q

DEFAULT: 0

PARAMETERS:
0: The shifted part consists of that part of the active line that resides within the work area. If the cursor is outside the work area, the shift operation is not performed.

CURSOR ACTION: None

ERROR HANDLING: Meaningless parameters are ignored, and an error condition occurs.

5.66 SD - Scroll Down

HEX SEQUENCE: <CSI> n 54

ASCII SEQUENCE: <CSI> n T

DIRECTION: Host to terminal

DEFAULT: 1 line

FUNCTION: SD scrolls the display *n* lines down by deleting *n* lines at the bottom and inserting *n* blank lines at the top.

Depending on the 'Origin Mode' switch setting, the function may be restricted to the work area.

PARAMETERS: One numeric parameter defining the number of lines to scroll.

CURSOR ACTION: None

ERROR HANDLING: If *n* exceeds the number of lines within the cursor boundary, the command is ignored and a parameter error occurs.

SEE ALSO: SU

5.67 SGR - Set Graphic Rendition

HEX SEQUENCE: <CSI> n1 3B ... nn 6D

ASCII SEQUENCE: <CSI> n1 ; ... nn m

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: SGR selects the graphic rendition of all characters subsequently written on the screen. The graphic selected will be the current graphic rendition. The graphic rendition is specified by a parameter value and the following values are accepted either individually, or in combinations.

Depending on the setting of the 'Graphic Rendition Combination Mode' switch, previous graphic rendition aspects will remain in effect or be explicitly changed by a following occurrence of SGR.

PARAMETERS:
0: Reset to default rendition
1: Ignored
2: Low intensity
3: Ignored
4: Underlined
5: Slow blink
6: Ignored
7: Inverse
8: Invisible

CURSOR ACTION: None

ERROR HANDLING: Unsupported graphic renditions are ignored, but no error condition occurs.

SEE ALSO: NDSAR, NDAAR, NDRAR

5.68 SI/SO - Shift In/Shift Out

HEX CODE 0E (SO - shift out)
0F (SI - shift in)

FUNCTION: This is according to ISO 2022 which means that in a 7-bit environment, SO invokes the G1 character set (a set of 94 graphic characters). SI invokes the graphic characters of the G0 set that are to replace the graphic characters of the G1 set.

CURSOR ACTION: None

ERROR HANDLING: None

5.69 SL - Scroll Left

HEX SEQUENCE: <CSI> n 20 40

ASCII SEQUENCE: <CSI> n <sp> @

DIRECTION: Host to terminal

DEFAULT: 40 columns

FUNCTION: SL shifts characters with their graphic renditions *n* columns to the left by inserting *n* blank columns to the right of the display and discarding *n* columns to the left.

Depending on the 'Origin Mode' switch setting, the function may be restricted to the work area.

PARAMETERS: One numeric parameter defining the number of columns to scroll.

CURSOR ACTION: None

ERROR HANDLING: If *n* exceeds the number of columns within the cursor boundary, the commandis ignored and a parameter error occurs.

SEE ALSO: SR

5.70 SR - Scroll Right

HEX SEQUENCE: <CSI> n 20 41

ASCII SEQUENCE: <CSI> n <sp> A

DIRECTION: Host to terminal

DEFAULT: 40 columns

FUNCTION: SR shifts characters with their graphic renditions *n* columns to the right by inserting *n* blank columns to the left of the display and discarding *n* columns to the right.

Depending on the 'Origin Mode' switch setting, the function may be restricted to the work area.

PARAMETERS: One numeric parameter defining the number of columns to scroll.

CURSOR ACTION: None

ERROR HANDLING: If *n* exceeds the number of columns within the cursor boundary, the commandis ignored and a parameter error occurs.

SEE ALSO: SL

5.71 SU - Scroll Up

HEX SEQUENCE: <CSI> n 20 53

ASCII SEQUENCE: <CSI> n <sp> S

DIRECTION: Host to terminal

DEFAULT: 1 line

FUNCTION: SU scrolls the display up *n* lines by deleting *n* lines at the top andinserting *n* blank lines at the bottom.

Depending on the 'Origin Mode' switch setting, the function may be restricted to the work area.

PARAMETERS: One numeric parameter defining the number of lines to scroll.

CURSOR ACTION: None

ERROR HANDLING: If *n* exceeds the number of lines within the cursor boundary, the command is ignored and a parameter error occurs.

SEE ALSO: SD

5.72 SS2/SS3 - Single Shift 2/3

HEX SEQUENCE:
1B 4E (SS2 7-bit mode)
8E (SS2 8-bit mode)
1B 4F (SS3 7-bit mode)
8F (SS3 8-bit mode)

ASCII SEQUENCE:
<ESC> N (SS2 7-bit mode)
<SS2> (SS2 8-bit mode)
<ESC> O (SS3 7-bit mode)
<SS3> (SS3 8-bit mode)

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: This is according to ISO 2022 which means that SS2 invokes one character from the last designated G2 set, and SS3 invokes one character from the last designated G3 set.

PARAMETERS: None

CURSOR ACTION: None

ERROR HANDLING: None

SEE ALSO: LS2/LS3

5.73 ST - String Terminator

HEX SEQUENCE: 1B 5C (7-bit mode)
9C (8-bit mode)

ASCII SEQUENCE: <ESC> \ (7-bit mode)
<ST> (8-bit mode)

DIRECTION: Host to terminal

DEFAULT: None

FUNCTION: ST is the closing delimiter of a string opened by DCS.

PARAMETERS: None

CURSOR ACTION: None

ERROR HANDLING: None

5.74 TBC - Tabulation Clear

HEX SEQUENCE: <CSI> s 67

ASCII SEQUENCE: <CSI> s g

DIRECTION: Host to terminal

DEFAULT: 0

FUNCTION: TBC is a format effector which causes one or more tabulation stops to be cleared, depending on the parameter values.

PARAMETERS:
0: Clear horizontal tab at cursor position
1: Ignored
2: Ignored
3: Clear all horizontal tab stops
4: Ignored

CURSOR ACTION: None

ERROR HANDLING: For undefined parameters, the sequence is ignored and a parameter error occurs.

5.75 VPA - Vertical Position Absolute

HEX SEQUENCE: <CSI> n 64

ASCII SEQUENCE: <CSI> n d

DIRECTION: Host to terminal

DEFAULT: n = 1

FUNCTION: VPA is a format effector which causes the cursor position to be moved to the corresponding horizontal position at line number *n*.

Note that if the 'Origin Mode' switch is set to on, coordinates are relative to the upper left corner of the current work area.

PARAMETERS: One numeric parameter specifying the line number.

CURSOR ACTION: As above

ERROR HANDLING: If *n* is outside the cursor boundary, the sequence is ignored and a parameter error occurs.

SEE ALSO: CUP, CHA

CHAPTER 6 DEVICE CONTROL STRINGS (DCS)

6.1 Start and end of an DCS sequence

The NOTIS emulator uses the Device Control String (DCS) sequences in its communication with the host computer, when features that are special for this terminal are performed.

All DCS sequences must start with the *DCS<90>* code and be terminated by the *ST<9C>* code.

The code following the DCS code, must be one of the following:

- *P<50>* indicating PUSH-key loading
- *F<46>* indicating PROGRAM-key loading
- *S<53>* indicating message display in normal graphics
- *B<42>* indicating message display in blinking graphics

The different types of DCS sequences are described in the following sections.

Each of the sequences has a strict format. If the format rule is violated, the loading will be aborted, and subsequently received characters will be treated as normal characters or codes.

6.2 PUSH-key loading

Format DCS P XX data/text ST

- *DCS P* is the start code.
- *XX* is a decimal numeral in the range 1 to 16 to specify the PUSH-key to be loaded.
- *data* is the contents of the PUSH-key. Only the first 80 characters that are downloaded will be saved. The rest will be ignored. For each character loaded, the hex value is represented by two ASCII digits (<30> to <39> and <41> to <46> or <61> to <66>).
- / (optional) is a separator with the ASCII value <2F>.
- *text* (optional) is the text that will be displayed on the label for the key. Only the first 16 characters that are downloaded are displayed. The rest will be ignored.

If ST follows the data string, the label for that key will display PKXX, where XX is the key number. This makes the ND Display Terminal 1200 PUSH-key system compatible with the TDV2200 terminal PUSH-key system.

Example

Load the word "Li-Fi" to PUSH-key no. 12, and display the label:


```
  DCS     P      12        L        i        -
<1B><50> <50> <31><32> <34><63> <36><39> <32><64>

    F       i     /
<34><36> <36><39> <2F>

   SP      SP       L        i        s
<32><30> <32><30> <34><63> <36><39> <37><33>

    t      SP       SP       SP       SP
<37><34> <32><30> <32><30> <32><30> <32><30>

    F       i        l        e        s
<34><36> <36><39> <36><63> <36><35> <37><33>

   ST
<1B><5C>
```

Below is an overview of what happens to the settings of the PUSH-keys with different loading conditions.

Input		Setting	
Data	Text (label)	Data	Text (label)
empty	empty	erased	altered
not empty	empty	altered	not altered
empty	not empty	not altered	altered
not empty	not empty	altered	altered

6.3 PROGRAM-key loading

Format DCS F XX data/text ST

- *DCS F* is the start code.
- XX is a decimal numeral from 1 to 16 to specify the PROGRAM-key to be loaded.
- *data* is the contents of the PROGRAM-key. Only the first 80 characters that are downloaded will be saved. The rest will be ignored. For each character loaded, the hex value is represented by two ASCII digits (<30> to <39> and <41> to <46> or<61> to <66>)
- / (optional) is a separator with the ASCII value <2F>
- *text* (optional) is the text that will be displayed on the label for the key. Only the first 16 characters that are downloaded are displayed. The rest will be ignored.

Example Load the word "Fs" to PROGRAM-key 3, and display the label:


```
  DCS      F    0    3      F        s      /
<1B><46> <53> <30> <33> <34><36> <37><33> <2F>

   SP       SP       F        i        n
<32><30> <32><30> <34><36> <36><39> <36><65>

    d       SP       SP       SP       S
<36><34> <32><30> <32><30> <32><30> <35><33>

    t        r        i        n        g
<37><34> <37><32> <36><39> <36><65> <36><37>

   ST
<1B><5C>
```

The default value for each key and label is empty.

Below is an overview of what happens to the settings of the PROGRAM-keys with different loading conditions.

	Input		Setting	
Key no.	Data	Text (label)	Data	Text (label)
Empty	empty	empty	default	default
00	-	-	default	default
not empty	empty	empty	not altered	emptied
not empty	not empty	empty	altered	emptied
not empty	empty	not empty	not altered	altered
not empty	not empty	not empty	altered	altered

If, for example, you send DCS F ST (<1B><50> <53> <1B><5C>) all the PROGRAM-keys will be reset to default.

CHAPTER 7 FUNCTION KEY SEQUENCES

The function key sequences for the ND Display Terminal 1200 are given in the tables which follow. Table 2 gives all the function key sequences in native mode, table 3 gives the sequences generated from the numeric keys in function mode and table 4 gives all the function key sequences in 2115 mode. The drawing below shows the keyboard; all the function keys are shaded.

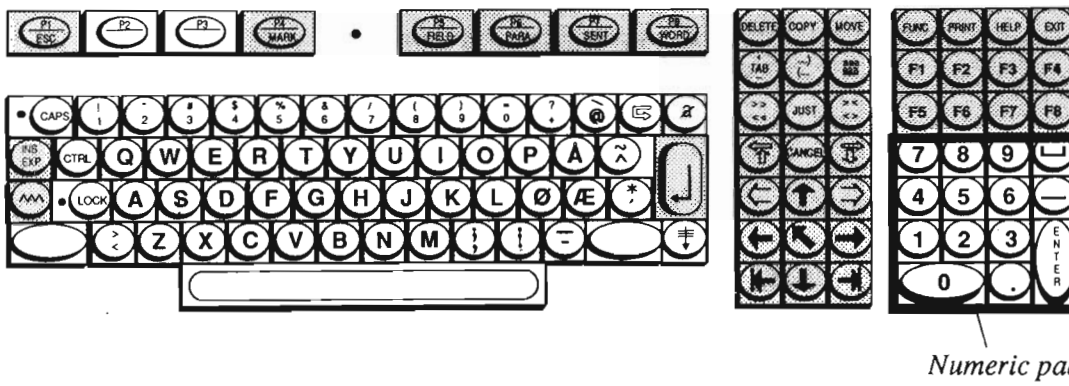


Figure 3. Keyboard overview

Table 2. Function key sequences generated in native mode

Key	Unshift	Shift	Control
ESC	<ESC>	<ESC>	
MARK	<CSI>=X	<CSI>=x	Ctrl<N>
FIELD	<CSI>=Y	<CSI>=y	
PARA	<CSI>=Z	<CSI>=z	
SENT	<CSI>=[	<CSI>={	
WORD	<CSI>=\	<CSI>=|	
DELETE	<CSI>=L	<CSI>=l	
COPY	<CSI>=M	<CSI>=m	
MOVE	<CSI>=N	<CSI>=n	
-TAB+	<CSI>=H	<CSI>=g	
(...)	<CSI>=O	<CSI>=o	
aaa aaa	<CSI>4m	<CSI>24m	
>><<	<CSI>5 F	<CSI>7 F	
JUST	<CSI> H	<CS > F	
><<>	<ESC>5 ;7F	<CSI>6 F	
← ↑	<CSI>S	<CSI>40 @	
CANCEL	<CSI>=P	<CSI>=p	
|→	<CSI>T	<CSI>40 A	
<==	<CSI>V	<CSI>=q	
==>	<CSI>U	<CSI>=r	
|←	<CSI>Z	<CSI>=s	
→|	Ctrl<I>	<CSI>=t	
FUNC	<CSI>=@	<CSI>=`	
PRINT	<CSI>=A	<CSI>=a	
HELP	<CSI>=B	<CSI>=b	
EXIT	<CSI>=C	<CSI>=c	
F1	<CSI>M	<CSI>=d	
F2	<CSI>L	<CSI>=e	
F3	<CSI>=F	<CSI>=f	
F4	<CSI>=G	<CSI>=g	
F5	<CSI>OP	<CSI>=h	
F6	<CSI>OQ	<CSI>=i	
F7	<CSI>OR	<CSI>=j	
F8	<CSI>OS	<CSI>=k	

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(table 2 continued)

Key	Unshift	Shift	Control
EKSP	<CSI>=V	<CSI>=v	
/\/\/\	<CSI>=W	<CSI>=w	
↵	<CSI>=U	<CSI>=u	
↑	<CSI>A	<CSI>A	
↓	<CSI>B	<CSI>B	
←	<CSI>C	<CSI>C	
→	<CSI>D	<CSI>D	
↖	<CSI>H	<CSI>H	

Table 3. Function key sequences generated from the numeric pad in function mode

Key	Unshift	Shift	Control
7	<ESC>Ow	<ESC>Ow	
8	<ESC>Ox	<ESC>Ox	
9	<ESC>Oy	<ESC>Oy	
⌴	<ESC>Om	<ESC>Om	
4	<ESC>Ot	<ESC>Ot	
5	<ESC>Ou	<ESC>Ou	
6	<ESC>Ov	<ESC>Ov	
-	<ESC>Ol	<ESC>Ol	
1	<ESC>Oq	<ESC>Oq	
2	<ESC>Or	<ESC>Or	
3	<ESC>Os	<ESC>Os	
0	<ESC>Op	<ESC>Op	
.	<ESC>On	<ESC>On	
ENTER	<ESC>OM	<ESC>OM	

Table 4. Function key sequences generated in 2115 mode

Key	Unshift	Shift	Control
ESC	Ctrl<[> ESC	Ctrl<[> ESC	Ctrl<[> ESC
MARK			Ctrl<N> SO
FIELD			
PARA			
SENT			
WORD			
DELETE			
COPY			
MOVE			
-TAB+			
(...)			
aaa aaa			
>><<			
JUST			
><<>			
←⎡	Ctrl<L> FF		
CANCEL			
⎣→	Ctrl<W> ETB		
<==			
==>			
⎣←			
→⎦	Ctrl<I> HT	Ctrl<I> HT	
FUNC			
PRINT			
HELP			
EXIT			
F1			
F2			
F3			
F4			
F5			
F6			
F7			
F8			

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(table 4 continued)

Key	Unshift	Shift	Control
EKSP			
/\/\/\			
↵			
↑	Ctrl<\> FS	Ctrl<\> FS	
↓	Ctrl<K> VT	Ctrl<K> VT	
→	Ctrl<X> CAN	Ctrl<X> CAN	
←	Ctrl<H> BS	Ctrl<H> BS	
↖	Ctrl<]> GS	Ctrl<]> GS	

CHAPTER 8 2115 COMPATIBILITY MODE

The 2115 compatibility mode accepts codes from the C0 and G0 sets. If escape sequences are received, the ESC code will be ignored, while the rest of the sequence will be displayed. This is identical to the behaviour of the TDV2115 terminal. The only exception to this rule is ESC Q which cancels 2115 compatibility mode and returns to the normal ISO mode.

8.1 Enter and exit 2115 mode

These sequences are the same as on TDV2200.

- Enter 2115 MODE: <CSI> 66 1
- Exit 2115 MODE: <ESC> Q

8.2 Attributes and G0/C0 codes

ATTRIBUTES To control the graphic rendition mode, the 'Graphic Rendition Combination' (GRM) switch on TDV2200 with parameter value 62 is implemented with the Set Mode/Reset Mode sequences in the FUNCTION MENU.

CODES SENT FROM KEYBOARD

The keyboard will send the same codes as on the TDV2200.

G0 CODES

The G0 character set is determined by the nationality set in the DISPLAY MENU.

C0 CODES

The following C0 control codes are accepted:

00NUL	Ignored - Not defined in 2115
01SOH	Ignored - Not defined in 2115
02STX	Ignored
03ETX	Ignored
04EOT	Erase line
05ENQ	Ignored
06ACK	Ignored
07BEL	Bell
08BS	Backspace
09HT	Ignored - Not defined in 2115
0ALF	Line feed
0BVT	Cursor down
0CFF	Roll up
0DCR	Cursor return
0ESO	Normal
0FSI	Underline
10DLE	Cursor load
11DC1	Ignored
12DC2	Ignored - Not defined in 2115
13DC3	Ignored
14DC4	Ignored - Not defined in 2115
15NAK	Ignored
16SYN	Ignored
17ETB	Roll down
18CAN	Cursor right
19EM	Erase page
1ASUB	Ignored - Not defined in 2115
1BESC	Special handling

1CIS4	FS	Cursor up
1DIS3	GS	Cursor home
1EIS2	RS	Ignored - Not defined in 2115
1FIS1	US	Ignored - Not defined in 2115

8.3 Description of the C0 codes

STX VIDEO OFF
This code is ignored.

ETX VIDEO ON
This code is ignored.

EOT ERASE LINE
Erases the active line, moves the cursor to the beginning of the line.

ENQ ENQUIRY
This code is ignored. (Used on 2115 to turn light 1 on).

ACK ACKNOWLEDGE
This code is ignored. (Used on 2115 to turn light 2 on).

BEL Sound the terminal bell. Affected by the 'Bell Volume' switch.

BS BACKSPACE
Moves the cursor one character position to the left. Affected by the 'Beginning of Line Wrap' switch.

LF LINE FEED
Moves the cursor to the same position on the line below. On the bottom line the action taken is affected by the 'Roll/Page' switch.

VT CURSOR DOWN
Moves the cursor to the line below. If the cursor is on the bottom line, no action will be taken.

FF ROLL UP
Shifts the page up one line and inserts a blank line at the bottom. The cursor position is unchanged.

CR CURSOR RETURN
Move the cursor position to the beginning of the current or next line depending on the 'Cursor Return' switch (CR/NEL).

SI UNDERLINE
Affected by the 'Graphic Rendition Combination' switch.

SO NORMAL
Affected by the 'Graphic Rendition Combination' switch.

DLE CURSOR LOAD
DLE is a lead-in for direct cursor addressing. The next two characters give the binary value of the desired cursor position. First line number (0-24); then column number (0-79). Parameters are accepted as long as the five rightmost bits are valid.

NAK NEGATIVE ACKNOWLEDGE
This code is ignored. (Used on 2115 to turn light 3 on).

SYN CLEAR LAMPS
This code is ignored. (Used on 2115 to turn off lamps).

ETB ROLL DOWN
Shifts the page down one line and a blank line will be inserted at the top. The cursor position is not changed.

CAN CURSOR RIGHT
Moves the cursor one character position to the right. Affected by the 'End of Line Wrap' switch.

EM ERASE PAGE
Erases the page and moves the cursor to the home position.

ESC ESCAPE
Exit 2115 mode if followed by Q. Otherwise ESC is ignored.

FS CURSOR UP
Moves the cursor to the same position on the line above. Ignored if the cursor is on the top line.

GS CURSOR HOME
Moves the cursor to the home position.

APPENDIX A CHARACTER SETS FOR THE ND DISPLAY TERMINAL 1200

This appendix contains all the characters that ND supports for the ND Display Terminal 1200.

A.1 Graphics I/Greek, character set 0

Octal	Character	Octal	Character	Octal	Character	Octal	Character
240	(space)	270		320	Π	350	η
241	▬	271		321	Θ	351	ι
242	■	272	↲	322	Ρ	352	
243	■	273		323	Σ	353	κ
244	■	274		324	Τ	354	λ
245	▬	275	▯	325	Υ	355	
246	▬	276		326		356	ν
247	▬	277	↖	327		357	ο
250	▬	300	@	330	Χ	360	π
251	▯	301	A	331	Ψ	361	θ
252		302	B	332	Ζ	362	ρ
253		303	Ξ	333	[	363	σ

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Octal	Character	Octal	Character	Octal	Character	Octal	Character
254		304	Δ	334	\	364	τ
255	~	305	E	335	]	365	υ
256		306	Φ	336		366	
257	©	307	Γ	337	†	367	ω
260		310	H	340		370	χ
261		311	I	341	α	371	ψ
262		312		342	β	372	ζ
263		313	K	343	ξ	373	{
264		314	Λ	344	δ	374	|
265		315	M	345	ε	375	}
266		316	N	346	φ	376	~
267		317	O	347	γ	377	(del)

A.2 Mathematical, character set 1

Octal	Character	Octal	Character	Octal	Character	Octal	Character
240	(space)	270		320		350	
241		271		321		351	
242		272		322		352	≡
243		273	∩	323		353	¬
244		274	⊂	324		354	
245		275	∪	325	⎨	355	
246		276	⊃	326	⎬	356	
247		277	≤	327	⎪	357	
250		300	≥	330	⎜	360	
251		301		331	⎡	361	
252		302		332	⎢	362	
253		303		333	⎣	363	
254		304		334	⎛	364	
255		305	∀	335	⎤	365	
256		306		336	⎥	366	
257		307		337		367	
260		310		340	∠	370	
261		311		341		371	

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Octal	Character	Octal	Character	Octal	Character	Octal	Character
262		312		342		372	‖
263		313		343		373	{
264		314		344	∂	374	–
265		315		345	∈	375	}
266		316		346	≠	376	~
267		317		347	≈	377	(del)

A.3 Diacritics, character set 2

Octal	Character	Octal	Character	Octal	Character	Octal	Character
240	(space)	270	È [1]	320	Ç [1]	350	¿ [1]
241	à [1]	271	Î [1]	321	c [1]	351	ć
242	À [1]	272	Ï [1]	322	C [1]	352	Ć
243	è [1]	273	ô [1]	323	s [1]	353	ĺ
244	É [1]	274	Ô [1]	324	S [1]	354	Ĺ
245	ì [1]	275	û [1]	325	z [1]	355	ń
246	Ì [1]	276	Ù [1]	326	Z [1]	356	Ń
247	ò [1]	277	ä [1]	327	đ [1]	357	ŕ
250	Ò [1]	300	A [1]	330	Đ [1]	360	Ŕ
251	ù [1]	301	ë [1]	331	ł [1]	361	ś
252	Ù [1]	302	E [1]	332	Ł [1]	362	Ś
253	á [1]	303	Ï [1]	333	ŧ [1]	363	ź
254	Á [1]	304	I [1]	334	Ŧ [1]	364	Ź
255	é [1]	305	ö [1]	335	å [1]	365	ö
256	É [1]	306	O [1]	336	Å [1]	366	Ö
257	í [1]	307	ü [1]	337	œ [1]	367	ü
260	Í [1]	310	U [1]	340	ø [1]	370	Ü
261	ó [1]	311	ÿ [1]	341	Œ [1]	371	

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Octal	Character	Octal	Character	Octal	Character	Octal	Character
262	Ó [1]	312	Ÿ [1]	342	Ø [1]	372	a
263	ú [1]	313	ã [1]	343	æ [1]	373	A
264	Ú [1]	314	Ã [1]	344	Æ [1]	374	g
265	â [1]	315	ñ [1]	345	ij [1]	375	G
266	Â [1]	316	Ñ [1]	346	ß [1]	376	
267	ê [1]	317	ç [1]	347	¡ [1]	377	(del)

A.4 NTX, character set 3

Octal	Character	Octal	Character	Octal	Character	Octal	Character
240	(space)	270		320		350	
241		271		321		351	
242		272		322		352	
243		273		323		353	
244		274		324		354	
245		275		325		355	
246		276		326		356	
247		277		327		357	
250		300		330		360	
251		301		331		361	
252		302		332		362	
253		303		333		363	
254		304		334		364	
255		305		335		365	
256		306		336		366	
257		307		337		367	
260		310		340		370	
261		311		341		371	

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Octal	Character	Octal	Character	Octal	Character	Octal	Character
262		312		342		372	
263		313		343		373	
264		314		344		374	
265		315		345		375	
266		316		346		376	
267		317		347		377	(del)

A.5 T, character set 5

Octal	Character	Octal	Character	Octal	Character	Octal	Character
240	(space)	270	÷	320		350	Ƀ
241	¡	271		321		351	Ø
242	c	272		322		352	Ɇ
243	£	273		323	●	353	
244	$	274	¼	324	|	354	
245		275	½	325		355	Ŧ
246	#	276	¾	326	–	356	
247	§	277	¿	327	└	357	
250		300		330	┴	360	
251		301	`	331	┘	361	æ
252		302	´	332	├	362	đ
253		303	ˆ	333	┼	363	
254	←	304	˜	334	┤	364	ħ
255	↑	305	¯	335	┌	365	
256	→	306		336	┬	366	ij
257	↓	307		337	┐	367	
260	°	310	¨	340	Ω	370	ŧ
261	±	311		341	Æ	371	ø

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(continued)

Octal	Character	Octal	Character	Octal	Character	Octal	Character
262	²	312	°	342	Þ	372	æ
263	³	313	,	343		373	ß
264	×	314		344	H	374	
265	µ	315	"	345		375	ŧ
266		316		346		376	
267		317		347		377	(del)

A.6 Graphics II, character set 6

Octal	Character	Octal	Character	Octal	Character	Octal	Character
240	(space)	270		320		350	
241		271		321		351	
242		272		322		352	
243		273		323		353	
244		274		324		354	
245		275		325		355	
246		276		326		356	
247		277		327		357	
250		300		330		360	
251		301		331		361	
252		302		332		362	
253		303		333		363	
254		304		334		364	
255		305		335		365	
256		306		336		366	
257		307		337		367	
260		310		340		370	
261		311		341		371	

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Octal	Character	Octal	Character	Octal	Character	Octal	Character
262		312		342		372	
263		313		343		373	
264		314		344		374	
265		315		345		375	
266		316		346		376	
267		317		347		377	(del)