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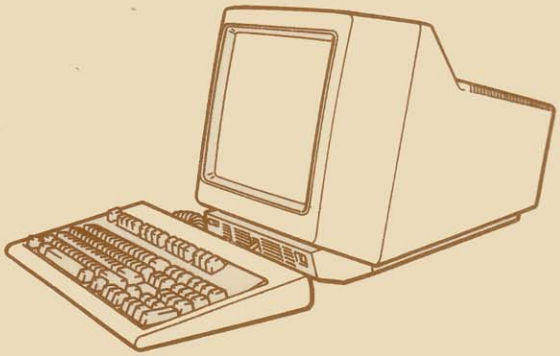
IBM 3151
ASCII Display Station

Reference Manual



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IBM

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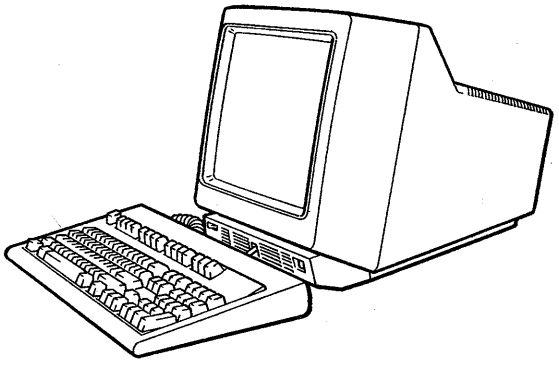

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First Edition (April 1987)

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Using This Guide

This guide provides information about the IBM 3151 functions and its various commands. It also introduces the IBM 3151 ASCII Display Station; what it can do and how it can be used. Information about installation planning is also described in this guide.

This guide is intended for:

- Installation planners and physical designers who plan and perform the IBM 3151 installation.
- System and application programmers who are responsible for such tasks as: integrating the IBM 3151 into the total system or coding programs.

  Programmers should have a basic understanding of ASCII programming.

This guide has eight chapters and five appendixes:

- Chapter 1, "Introduction" introduces the IBM 3151 and describes its functions.
- Chapter 2, "Terms and Concepts" explains some of the terms and concepts used when operating the IBM 3151.
- Chapter 3, "3151 Operations" describes the IBM 3151 operations.
- Chapter 4, "Keyboard Functions" describes the function of each key.
- Chapter 5, "Operator Messages" describes how to interpret the operator messages that are displayed in the operator information area (bottom line of the screen).

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- Appendix B, "Summary of Commands" summarizes the IBM 3151 commands.
- Appendix C, "AID Codes Generated by Keys" lists the IBM 3151 AID (attention identification) codes.
- Appendix D, "Summary of Commands in IBM 3101 Emulation Mode" summarizes the IBM 3101 commands in emulation mode.
- Appendix E, "Summary of Commands in Ten ASCII Terminals' Emulation Mode" summarizes the Ten ASCII terminals' commands in emulation mode.

Related Publications

- *IBM 3151 ASCII Display Station Guide to Operations*, GA18-2633

  This guide explains how to install and set up the IBM 3151. It also provides introductory information and explains the key functions, indicators, and messages that are displayed in the operator information area. The built-in emulations are also described in this guide. The problem solving section in this guide is used to isolate failing elements.

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- Appendix E, "Summary of Commands in Ten ASCII Terminals' Emulation Mode" summarizes the Ten ASCII terminals' commands in emulation mode.
- Appendix F, "Supplemental Information for National Language Machines" provides additional information for national language machines.

Related Publications

- *User' Guide for the Cartridge to Emulate IBM and DEC[1] Terminals*, GA18-2654

  This guide describes how to use the 3151 cartridge to emulate the DEC VT220, or to operate the IBM 3151 when attached to the IBM 3708 Network Conversion Unit or the IBM 3710 Network Controller.

- *User's Guide for the Cartridge to Emulate WYSE WY-50/50[2] Terminals*, GA18-2657

  This guide provides information to emulate the WYSE WY-50/50+ terminals using the IBM 3151.

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- *User's Guide for the Cartridge to Emulate WYSE WY-50/50+*[2] *Terminals*, GA18-2657

  This guide provides information to emulate the WYSE WY-50/50+ terminals using the IBM 3151.

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2 Trademarks of Wyse Technology

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Chapter 1. Introduction

This chapter provides an overview of the IBM 3151 ASCII Display Station.

Contents

Overview

The IBM 3151 is an ASCII Display Station that is used to enter data into or retrieve data from a host system. It can be connected to both IBM and non-IBM systems.

The 3151 consists of a video element, a keyboard, a cartridge, and a stand (accessory) as shown in Figure 1-1.

The U.S. English machine does not use a cartridge for its operation in native (3151) or built-in emulation mode. An optional cartridge can be inserted into the rear of the video element to emulate other manufacturers' display terminals, whose emulations are not built-in.

The national language machines include a national language cartridge and a national language keyboard. The national language machines can display characters in their countries' languages.

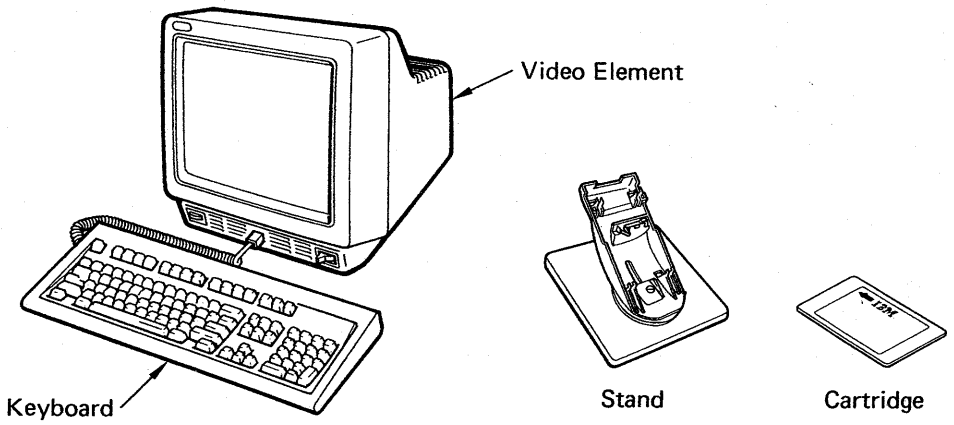


Figure 1-1. IBM 3151 ASCII Display Station

Video Element

The video element is used to display data sent from the host system or data entered from the keyboard on the 14-inch monochrome screen. It controls the 3151 functions and communications. It provides connectors for:

- The keyboard cable at the front side
- The communication cable at the rear side
- The optional device (such as a printer) cable at the rear side
- The power cord at the rear side.

It also provides the cartridge slot at the rear side.

The optional stand, which enables the adjustments of tilt and swivel for the video element, can be ordered.

Figure 1-2 shows the locations of the connectors, controls, and indicators on the video element.

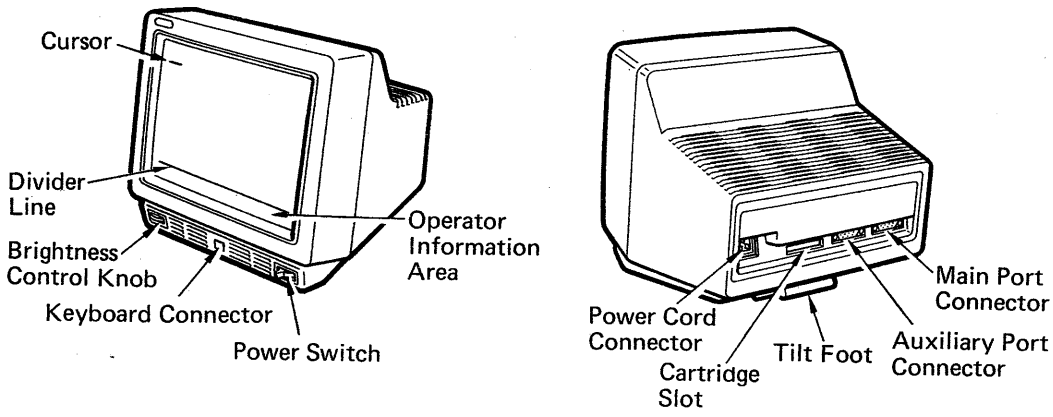


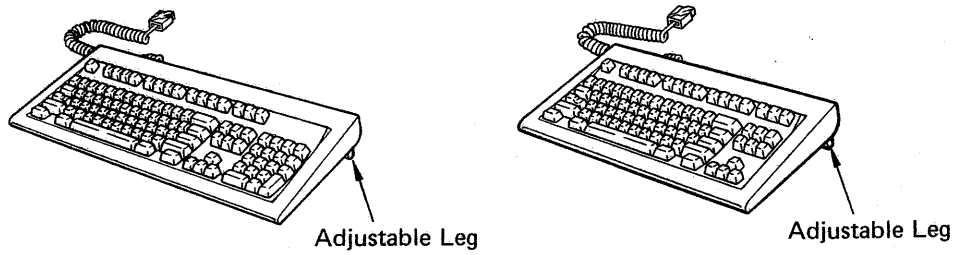
Figure 1-2. Video Element

Keyboard

The keyboard is used to enter data and perform various functions. You can also enter some host commands from the keyboard. Adjustable legs located at the rear of the keyboard allow you to change the keyboard angle for operating comfort. The volume of the audible alarm can be changed from the keyboard using the *+Alrm* or *−Alrm* key.

The keyboard for Models 31 and 41 provides a numeric keypad, which makes it easy to enter numeric characters. You can also use the unique line-drawing symbols for drawing lines and making tables. A keyboard overlay (GX18-2143) is provided to make the use of the function keys easier when the keys are redefined. You can also replace the key-caps with the accessory key-caps (see "Accessories" on page 1-5).

The keyboard for the Model 11 provides the numeric lock function for easier data input, instead of the numeric keypad. The replaceable key-caps and line-drawing symbols are not available for this keyboard.



(with Numeric Keypad)

(without Numeric Keypad)

Figure 1-3. Keyboards

Accessories

The following accessories can be ordered:

- Key caps for ten ASCII emulation (part 1392098)
- Blank light key-caps (60 units) with removal tool (part 1351710)
- Blank dark key-caps (60 units) with removal tool (part 1351728)
- Clear lens caps with paper inserts and removal tool (part 6341707)
- Paper inserts for clear lens (part 6341704)
- Key-cap removal tool (6 units) (part 1351717)
- Multi-function attachment cable (part 8310553)
- 1.8 m (6 ft) length power cord (part 6952301), U.S. only
- Modem cable (part 6343332)
- I/O cable (part 6343373)
- Tilt/swivel stand (part 81x4450).

Models

Three models are available for the 3151; 11, 31, and 41.

Note: Model numbers will be suffixed by an alphanumeric character, which defines the type of language, for example. In this guide, the suffix is omitted for model numbers.

Models 31 and 41 differ only in the color of the characters displayed on the screen. Characters are displayed in *green* for Models 11 and 31 while they are displayed in *amber-gold* for the Model 41. Models 31 and 41 provide more functions (such as 132-column, split screen, and keyboard with numeric keypad) than the Model 11.

IBM marketing representatives will supply information about the models that are available in each country.

3151 Functions

Figure 1-4 summarizes the various functions of the 3151.

Note: In the following figure, * means that the function is not supported for the Model 11.

Function	Description
Setup Menus	The setup menus are used to define the 3151's setup parameters so that the 3151 can correctly communicate with a host system or a printer. When you power-on the 3151 the first time after installation, the setup menu appears informing you to define the setup values. You can also display the menu using the *Setup* key.
Screen Format	The 3151 can display data characters in one of the following screen formats: • 24 lines of 80 characters each (1920 characters) • 25 lines of 80 characters each (2000 characters) • 24 lines of 132 characters each (3168 characters)* • 25 lines of 132 characters each (3300 characters)*. You can select the screen format from the setup menu or by using the Create Viewport command.
Viewport Type*	The screen can be divided vertically (up to three) for simultaneous viewing. A viewport (partition) can be selected using the *Jump* key*.

Figure 1-4 (Part 1 of 5). 3151 Functions

Function	Description
Displayed Characters	The 3151 can display blink, underscore, reverse video, and high intensity characters, or display no characters. How characters are displayed are defined by a field attribute or a character attribute. The 3151 can also select normal or reverse video for the whole screen from the setup menu.
Scrolling	There are three types of scrolling; jump, slow smooth*, and first smooth. The differences among the types are how the lines are moved up or down (rapidly or smoothly).
CRT Saver	The screen goes blank if no data is received from the host system or entered from the keyboard for 15 minutes when the CRT Saver parameter is set to ON in the setup menu. This function can extend the life of the CRT (cathode-ray tube).
Cursor Type	You can select the cursor type among block, blinking block*, bar, and blinking bar* using the *Alt Csr* key.
Operator Information Area	The screen area on the bottom line of the screen is called operator information area (OIA). The OIA can display the 3151 status or the host message. The OIA is not displayed when you power-on the 3151 the first time after installation. You can turn on and select the OIA indication using the *Msg* key (the selection is saved for later use).
Send Mark (⏏)	A send mark (created by the Write Send Mark command) can be used to specify the print area or send area on the screen.

Figure 1-4 (Part 2 of 5). 3151 Functions

Function	Description
Host Message*	Application programs can use the Write Host Message command to send a message to the attached 3151s. When the 3151 receives a host message, the message is stored in the 80-character buffer (or 132-character buffer in 132-column mode). It can be displayed by using the *Msg* key or by the Display Host Message command.
Line-drawing Symbols*	You can use 24 line-drawing symbols on the numeric keypad for drawing lines and making tables.
Superscript and Subscript Characters*	You can enter these characters together with the numeric keys.
Program Function Keys	Function keys (*F1—F36* for Models 31 and 41, or *F1—F12* for the Model 11) can be redefined from the keyboard (using the *Def F* key) or by the Load Programmable Function Key command. ESC (escape) sequences, ASCII control characters, or character strings can be assigned to each function key. The Model 11 can store up to 128 characters, and Models 31 and 41 can store up to 512 characters for all function-key definitions. The maximum number of the characters to be assigned to each function key is 32 for the Model 11 and 64 for Models 31/41. If you do not redefine a function key, an associated AID code (see Appendix C, "AID Codes Generated by Keys") is generated when the function key is pressed.

Figure 1-4 (Part 3 of 5). 3151 Functions

Function	Description
Program Access Keys*	An associated AID code (see Appendix C, "AID Codes Generated by Keys") is generated when the program access key (*PA1* through *PA3*) is pressed.
Replaceable Keys*	You can replace the key-caps with the accessory key-caps.
Alarm Keys	The volume of the audible alarm can be changed from the keyboard using the *+Alrm* or *−Alrm* key.
Outbound Trace	The data sent from the host system is transferred to the optional device on the auxiliary port without data conversion while displaying the same data on the screen. This operation is started by the *Trace* key and does not affect communications between the host system and the 3151.
Pass-through	• Outbound pass-through operation The 3151 passes the data from the host system to the optional device, by adding a preceding DLE DC2 and a trailing DLE DC4. • Inbound pass-through operation* The 3151 separates the data from the optional device into several data blocks, and places the DLE DC2 at the beginning and DLE DC4 at the end of each data block; then sends the data blocks to the host system.

Figure 1-4 (Part 4 of 5). 3151 Functions

Function	Description
Built-in Emulation	The 3151 can emulate the IBM 3101*. The following ten ASCII terminals can also be emulated for the U.S. English machine: • ADM[1]-3A • ADM-5 • ADDS[2] Viewpoint-A2 • Hazeltine[3] 1500 • TeleVideo[4] Model 910 • TeleVideo Model 910 • TeleVideo Model 912 • TeleVideo Model 920 • TeleVideo Model 925 • TeleVideo Model 925E.
Optional Cartridges*	The following cartridges are available to emulate other manufactures' display terminals. • 3151 cartridge to emulate IBM and DEC terminals • 3151 cartridge to emulate WYSE WY-50/50+ terminals (U.S. English machine only).

Figure 1-4 (Part 5 of 5). 3151 Functions

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2 Trademark of Applied Digital Data Systems, Incorporated

3 Trademark of Esprit Systems, Incorporated

4 Trademark of TeleVideo Systems, Incorporated

Differences in Functions between Model 11 and Models 31/41

The following figure summarizes the differences in functions between the Model 11 and Models 31/41 (in the figure, 'yes' means the function is provided and 'no' means the function is not provided).

Functions	Model 11	Models 31 and 41
3101 Emulation	no	yes
Ten ASCII Terminals' Emulation (U.S. English Machine Only)	yes	yes
132-column Screen	no	yes
Scrolling	Jump and fast smooth	Jump, fast smooth, and slow smooth
Split Screen	no	yes
Blinking Cursor	no	yes
Host Message	no	yes
Keyboard with Numeric Keypad	no	yes
Keyboard without Numeric Keypad	yes	no
Numeric Lock	yes	no
Line-drawing Symbols	no	yes
Subscript and Superscript	no	yes
PF Keys	12 PF keys and 128-character buffer	36 PF keys and 512-character buffer
PA Keys	no	yes
Pass-through	Outbound only	Inbound and outbound

Figure 1-5 (Part 1 of 2). 3151 Functions in Each Model

Functions	Model 11	Models 31 and 41
Optional Cartridges	no	• 3151 cartridge to emulate IBM and DEC terminals • 3151 cartridge to emulate WYSE WY-50/50+ terminals (U.S. English machine only)

Figure 1-5 (Part 2 of 2). 3151 Functions in Each Model

Attaching the 3151 to a Host System

This section explains some of the considerations involved when attaching the 3151 to host systems. An overview of how the 3151 attaches to host systems is also given.

The 3151 attaches to host systems over *serial* links. Electrically, you can attach the 3151 with either an EIA standard RS-232C serial connection, or an EIA standard RS-422A serial connection[5]. The details of these connections are described in "Communication Characteristics" on page 8-15.

Note: The RS-422A serial connection is available when the '3151 cartridge to emulate IBM and DEC terminals' is used for Models 31 and 41.

Once you have chosen the RS-232C as electrical connection, you can choose the *line control* you want to use among from PRTS (permanent request to send), IPRTS (induced permanent request to send), or CRTS (controlled request to send). PRTS and IPRTS require the full-duplex (FDX) communication facility be installed and CRTS require the half-duplex (HDX) communication facility be installed. Line control determines how the signals are handled to establish the logical connection between a terminal and a modem. The details of the logical connections are described in "Handshaking of RS-232C Interface" on page 8-24.

The 3151 can also attach an optional device, such as a printer or another 3151, on the auxiliary port by using an EIA RS-232C interface.

The line speed for communicating with a host system ranges from 50 to 38400 bps and the line speed with an optional device ranges from 50 to 19200 bps.

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5 EIA RS-232C is equivalent to CCITT V.24 and V.28. EIA RS-422A is equivalent to CCITT V.11. The Electronic Industries Association (EIA) controls the RS-232C or RS-422A standard in the United States and Canada. The International Telegraph and Telephone Consultive Committee (CCITT) controls the V.11, V.24, or V.28 standard in most countries.

Note: 38400 bps can also be used for the communications with the optional device in ten ASCII terminals' emulation mode.

Chapter 2. Terms and Concepts

This chapter explains some of the terms and concepts used when operating the 3151.

Contents

Screen Management

This section describes how the 3151 manages the screen.

Screen Formats

Display Space

The 3151 can display data characters in one of the following screen formats:

- 24 lines of 80 characters each (1920 characters)
- 25 lines of 80 characters each (2000 characters)
- 24 lines of 132 characters each (3168 characters)
- 25 lines of 132 characters each (3300 characters).

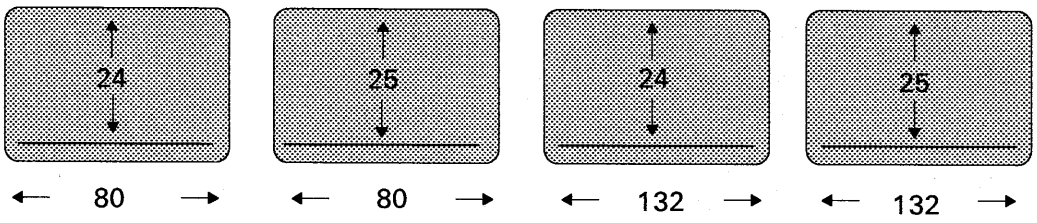


Figure 2-1. Screen Formats

You can select a screen format from the GENERAL menu or by the Create Viewport command.

Operator Information Area

The bottom line of the screen is called *operator information area* (OIA), which can be separated from the display space by the divider line. The divider line is effective when power is turned on; however, to be displayed or not depends on the *Msg* key selection. The existence of the divider line is controlled by the Enable/Disable OIA Divide Line commands.

Viewport, Partition, and Page

Viewport

The screen can be divided into rectangular areas called *viewports* by the Create Viewport command. The 3151 provides three viewport types as shown in Figure 2-2.

Viewport type 1 has one viewport, viewport type 2 has two viewports, and viewport type 3 has three viewports, on the screen. When power is turned on, viewport type 1 is assumed until you specify a different viewport type from an application program.

A viewport is used when explaining how the screen is physically divided.

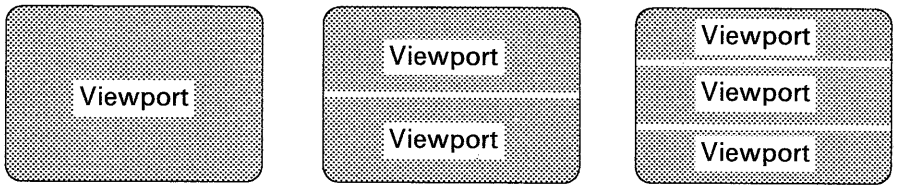


Figure 2-2. 3151 Viewport Types

Partition

Each viewport has an independent character buffer called *a partition.*

A partition is classified into two types; host partition and active partition. A *host partition* is selected by the Select Host Partition command. It is an area which an application program writes or reads data. An *active partition* is an area which an operator can access. It contains the cursor and is selected by the Select Active Partition command, the Jump Partition command, or the *Jump* key. For the operator, the active partition is the current partition, and for an application

program, the host partition is the current partition. The active partition and the host partition may differ.

Page

Each partition also has a block of data called *a page*, which has an independent buffer address. Because the 3151 allows only one page to be contained in each partition, a partition and a page represent the same thing. Figure 2-3 shows the relationship among a viewport, a partition, and a page.

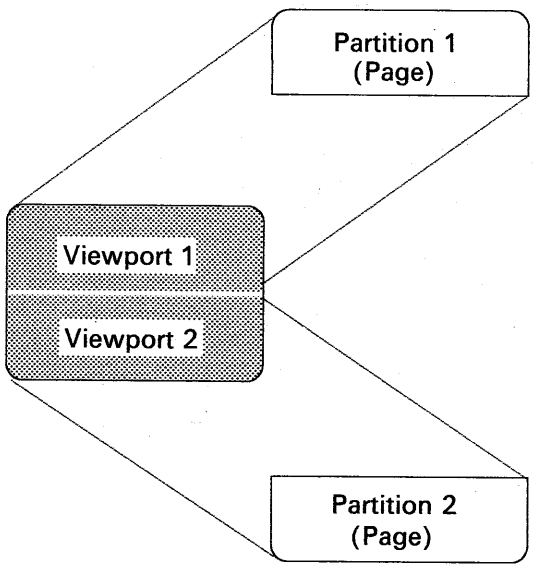


Figure 2-3. Viewport, Partition, and Page

Partition Separator Line

Each partition can be visibly separated by the partition separator line. The partition separator line is not displayed when power is turned on. The Enable/Disable Partition Separator Line commands can turn on or off the indication of the partition separator line.

Field

A field consists of a field attribute (such as high-intensity and blinking) and the data following it.

Formatted and Unformatted Pages

A page containing a field is called *a formatted page* and a page containing no fields is called *an unformatted page.*

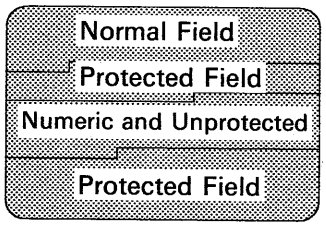
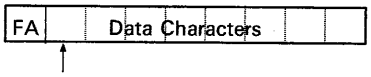


Figure 2-4. Example of a Formatted Page

Field Attributes



First Character Position

A field attribute (FA) occupies the first position of a field and is used to define; (1) whether the field should be displayed, (2) if displayed, how characters in the field will appear on the screen (intensified, underscored, blinking, or reversed), (3) whether the field is protected. FAs are not displayed. FAs are defined by the Set Field Attribute command.

Field attributes include:

- Non-display

  Characters are not displayed.

- High intensity

  Characters are displayed brighter than normal.

- Blink

  Characters flash on and off.

- Underline

  Characters (including null characters) are underscored.

- Reverse

  Characters are displayed in reverse video when the Screen parameter is NORMAL.

- Numeric

  Only numeric characters (0-9), the minus sign (-), and the period (.) can be entered.

  Note: Characters generated with the *Shift* key (for example, uppercase characters) can also be entered in this field.

- Protected

  No characters can be modified from the keyboard, or from the host system when host protect is enabled.

- Modified Data Tag (MDT)

  This bit is checked during a send or read operation to identify modified fields.

  This bit is set on for each field when:

  - The Set Field Attribute command, with the MDT bit set on, is received.
  - The field is modified from the keyboard; (1) characters are typed, (2) *Delete, Del Ln, Insert, Ins Ln,* or *Erase EOF* key is pressed, (3) Insert Character, Insert Line, Delete Character, Delete Line, or Erase EOL/F command is received.

  This bit is reset off for each field when:

  - The Set Field Attribute command with resetting the MDT bit is received.
  - The *Er Inp* key is pressed or the Erase Input command is received.
  - A send or read operation is completed and the "Lock Keyboard and Keep MDT Bit" parameter is OFF.

Default Field Attribute

When power is turned on, the area from the beginning of the page to the first field is handled as a successive field from the last field in the same page. This means that the characteristics of that area may change as a new field is created in the same page, which may produce a screen that is unpleasant to view.

The Enable Default Field Attribute command can be used to avoid such a condition by specifying the area from the beginning of the page to the first field as *a default field attribute field.* A default field attribute setting is; normal display, normal intensity, non-blink, non-underline, normal video, non-numeric, and unprotected.

Field Attribute Visible Renditions

When power is turned on, the area from the last field attribute character position to the end of the page, which is the last field, is controlled by the last field attribute character. This means that the characteristics of the bottom part of the screen (page) changes as a new field is created at the bottom, which may produce a screen that is unpleasant to view.

The Disable Field Attribute Visible Renditions command can be used to make some field attributes (high intensity, underline, blink, and reverse video) ineffective to avoid such a condition. You can use the Enable Field Attribute Visible Renditions command to make the hidden attributes effective on the screen after defining the page characteristics.

Host Protect

When power is turned on, an application program can write the data into the protected fields. This condition, however, can be changed by using the Enable Host Protect command.

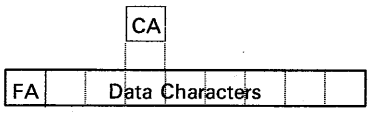
Read-Modified-Field and Read-Unprotected-Field Modes

When power is turned on, the 3151 sends only the modified field data to the host system in response to a read or send request. The Enable Read Unprotected Field command can change the read or send data from the modified field data to the unprotected field data.

Write Null

When power is turned on, null characters sent from the host system are ignored. When the Enable Write Null command is received, null characters are handled as an ASCII graphic character and are displayed as a space character on the screen.

Character Attributes



A character attribute (CA) occupies no position on the screen and is used to define whether the character with the CA (and possibly the following characters) should be displayed, and if displayed, how the characters will appear on the screen (intensified, underscored, blinking, or reversed). Once the CA is specified, it is effective until a new CA or a new field attribute is specified in the data stream. CAs are defined by the Set Character Attribute command.

Character attributes include:

- Non-display

  Characters are not displayed.

- High intensity

  Characters are displayed brighter than normal.

- Blink

  Characters flash on and off.

- Underline

  Characters (including null characters) are underscored.

- Reverse

  Characters are displayed in reverse video when the Screen parameter is NORMAL.

Cursor Address and Buffer Address

There are two addressing modes for the 3151; cursor address and buffer address modes. *A cursor address* is specified by the (Extended) Set Cursor Address command and *a buffer address* is specified by the (Extended) Set Buffer Address command.

Note: The Extended Set Cursor (Buffer) Address command should be used for 132-column mode.

Cursor Address Mode

When power is turned on, the 3151 enters cursor address mode, and both the cursor and the buffer addresses are set to the home position. A cursor address specifies the cursor position and can be changed by the operator using the *Cursor Move* keys, regardless of the current addressing mode. A character entered from the keyboard or received from the host system is stored (and may be displayed) at the cursor (cursor address) position on the screen.

This mode is changed to the buffer address mode by the (Extended) Set Buffer Address command.

Buffer Address Mode

The current buffer address is initially set to the current cursor address, and stays until the (Extended) Set Buffer Address command is received from the host system. The 3151 enters buffer address mode when receiving the (Extended) Set Buffer Address command. Once the 3151 enters buffer address mode, data received from the host system is handled by the buffer address. The host system can send a character and display it without changing the cursor position (and also cursor address). The 3151 remains in buffer address mode until one of the following commands is received:

- Cursor Move
- Cursor Home
- Insert Cursor
- Reset Buffer Address Mode
- (Extended) Set Cursor Address.

Note: The last buffer address remains unchanged when exiting buffer address mode.

Addressing Modes, Cursor, and Current Line

Each key starts the associated operation according to the screen's cursor position. The cursor address may be changed after the completion of the operation. For each key, the current line means the line on which the cursor is located.

Each command, however, starts the associated operation according to the current addressing mode. When operating in cursor address mode, a command uses the cursor address for the operation affecting the cursor address. When operating in buffer address mode, a command uses the buffer address for the operation affecting the buffer address. For each command, the current line is determined by the cursor address (when in cursor address mode) or by the buffer address (when in buffer address mode).

Characters Sets

This section shows the character sets that are used by the 3151 and their code pages (tables).

Character Sets for the U.S. English

The 3151 can use two character sets; U.S. ASCII and special graphics. The U.S. ASCII character set conforms to ANSI (American National Standards Institute) X3.4 and ISO (International Organization for Standardization) 646. The special graphics character set contains 44 special graphic characters; superscripts, subscripts, and line-drawing. Each character set uses a different code page.

Figure 2-5 on page 2-15 and Figure 2-6 on page 2-16 show the code page (hexadecimal notation is used) for each character set.

Note: The Model 11 cannot enter characters in the special graphics from the keyboard.

Code Page for U.S. ASCII Character Set

Bits				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1	Hex 0 / Hex 1	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENG	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	A	LF	SUB	*	:	J	Z	j	z
1	0	1	1	B	VT	ESC	+	;	K	[	k	{
1	1	0	0	C	FF	FS	,	<	L	\	l	|
1	1	0	1	D	CR	GS	-	=	M	]	m	}
1	1	1	0	E	SO	RS	.	>	N	^	n	~
1	1	1	1	F	SI	US	/	?	O	_	o	DEL

Figure 2-5. Code Page for U.S. ASCII Character Set

Code Page for Special Graphics Character Set

Bits				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1	Hex 0 / Hex 1	0	1	2	3	4	5	6	7
0	0	0	0	0				0			0	▮
0	0	0	1	1				1			1	—
0	0	1	0	2				2			2	▬
0	0	1	1	3				3			3	▬
0	1	0	0	4				4			4	├
0	1	0	1	5				5			5	┤
0	1	1	0	6				6			6	┴
0	1	1	1	7				7			7	┬
1	0	0	0	8				8			8	│
1	0	0	1	9				9			9	
1	0	1	0	A							┘	╮
1	0	1	1	B							┐	╯
1	1	0	0	C				▶			┌	╰
1	1	0	1	D				◀			└	╭
1	1	1	0	E				▲			+	■
1	1	1	1	F				▼			▮	

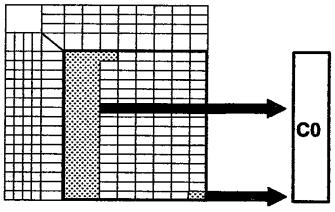
Figure 2-6. Code Page for Special Graphics Character Set

Selecting a Character Set

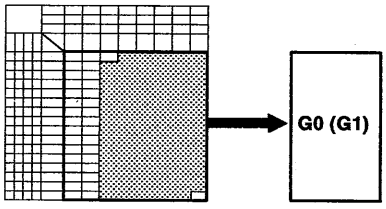
When power is turned on, the U.S. ASCII and special graphics character sets are assigned to the G0[1], the G1[1] and the C0[2] spaces as follows:

- ASCII control characters (X'00' through X'20' and X'7F' in the U.S. ASCII character set) are assigned to the C0 space.
- ASCII graphic characters (X'21' through X'7E' in the U.S. ASCII character set) are assigned to the G0 space.
- 44 special graphic characters (X'21' through X'7E' in the special graphics character set) are assigned to the G1 space.

The following illustrates these operations.



U.S. ASCII Character Set



U.S. ASCII Character Set
(Special Graphic Character Set)

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1 G0 and G1 are the spaces addressable by hexadecimal codes (X'21' through X'7E').

2 C0 is the space addressable by hexadecimal codes (X'00' through X'20' and X'7F').

From the Host System: Application programs can use the Select Character Set G0/G1 commands to assign either the U.S. ASCII character set or the special graphics character set to the G0 or the G1 space.

After the character sets have been assigned to the G0 and G1 spaces, the spaces can be accessed as follows:

- When the Word Length parameter is 7-bit; ASCII control characters (SI and SO) are used to select the G0 and G1 spaces, respectively.

- When the Word Length parameter is 8-bit; the most significant bit (MSB), which is bit 8, is used to select the G0 and G1 spaces. If MSB is set to B'1', G1 is selected; If MSB is set to B'0', G0 is selected. SI and SO are ignored in both cases.

Note: In 7-bit mode operation, one byte (SI or SO) is used to change a character set, however, in 8-bit mode, the MSB (one bit) can do the same thing. This is the only difference between the 8-bit and 7-bit modes of operation in the 3151.

From the Keyboard: The 3151 places the Select Character Set G0/G1 response, and/or the SI or SO character (in 7-bit mode) in front of the character that is entered from the keyboard before sending the character to the host system, if changing the character set or changing the space to be used is needed.

When the U.S. ASCII character set is assigned to the G0 space and the special graphic character set is assigned to the G1 space (default assignment), the 3151 does not generate the Select Character Set G0/G1 response. It places the SO character in front of the line-drawing, superscript, or subscript character when the previous character is not in the G1 space. The 3151 places the SI character after the previous character when the character in the G0 space is selected again.

Note: The selection of the character sets for the inbound and outbound data stream is independent of each other. That is, when the special graphics character set is **not** assigned to the G1 space and the 3151 is operating in the line-drawing mode, the characters (in the outbound G1 space) sent from the host system are displayed on the screen as the characters in the outbound G1 space.

Reverse Question Mark

The 3151 displays a reverse question mark (؟) if one of the following conditions occurs:

- A setup value, such as the line speed, parity, or stop bit, does not match the host system.
- A parity error occurred in the received data.
- A stop bit was dropped in the received data (framing error).
- An overrun condition occurred in the 3151 when receiving data.
- A break signal was detected.
- SUB (X'1A') is received from the host system.

Note: The '@' mark is displayed instead of the reverse question mark when the 3151 is operating in ten ASCII terminals' emulation mode.

Chapter 3. 3151 Operations

This chapter describes the 3151 operations.

Contents

Defining Setup Values

Before you can use the 3151, you must define the setup values so that the 3151 can correctly communicate with the host system or printer. These definitions should be done by setup personnel when installing the 3151. "How-to" information is presented in the *IBM 3151 ASCII Display Station Guide to Operations*. "How to Define Setup Values Using Menus" on page 7-10 briefly describes the instructions.

Redefining Program Function Keys

You can redefine function keys *F1* through *F36* from the keyboard or by the Load Programmable Function Key command.

Note: *F13* through *F36* are not supported for the Model 11.

The Set All Default Function Keys or Set Default Function Key command can be used to return the function-key definitions to their default values.

F13 through *F24* are selected when the respective key is pressed with the *Shift* key. *F25* through *F36* are selected when the respective key is pressed with the *Shift* and *Ctrl* keys.

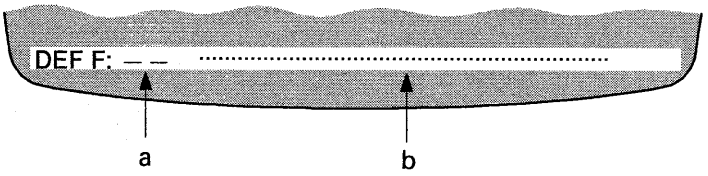
ESC (escape) sequences or a character string can be assigned to each function key. If you do not redefine a function key, an associated AID code (see Appendix C, "AID Codes Generated by Keys") is generated when the function key is pressed.

The Model 11 can store up to 128 characters and Models 31/41 can store up to 512 characters for all function-key definitions, for later use. The maximum number of characters to be assigned to each function key is 32 for the Model 11 and 64 for Models 31/41.

The following shows how to redefine function keys from the keyboard.

Step 1. Press and hold the *Ctrl* key; then press the *Def F* key.

The function key menu should appear as shown below.

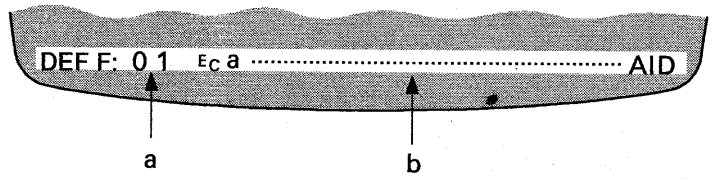


a: A two-digit number (01 through 36) of a function key is entered here.
b: The function is entered here.

Step 2. In area **a**, type a two-digit key number and press the *Send* key.

For example, suppose you want to display (or send) **Dear Sir,** at the cursor position and perform a carriage return when you press the *F1* key, type 01 in area **a**.

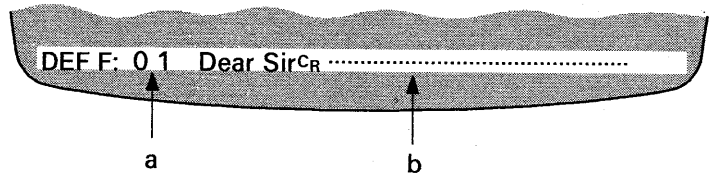
The menu will change as follows: (It shows the IBM-supplied default setting, AID format.)



Step 3. In area **b**, type one or more ESC sequences or a character string.

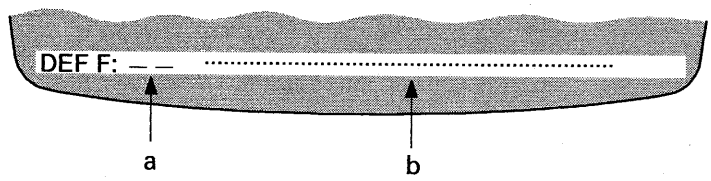
In this case, type **Dear Sir,** and enter the CR character (generated by pressing the *M* key while holding down the *Ctrl* key).

The bottom of the screen should look like this.



Step 4. Press the *Send* key to store the redefined key.

The bottom of the screen should now be:



Repeat Steps **2** through **4** until you define all necessary function keys.

Step 5. To exit this mode, press and hold the *Ctrl* key; then press the *Def F* key.

Notes:

1. *If you try to assign more than 128 (Model 11) or 512 (Models 31/41) characters for all function-key definitions, overflow characters are discarded and area **a** will blink at Step 4.*

2. *If you do not want to save the definition, press the **Def F** key while holding down the **Ctrl** at step 4.*

3. *If you press the **Clear** key when the cursor is located in area **b**, the field is set with the default value (AID format).*

4. ●●●● *in the menu show the null characters. The trailing null characters are removed from the definition.*

Power-on Reset

When power is turned on, the 3151 is initialized as follows:

- The internal circuits are checked (takes about 5 seconds and the DTR signal is off during this period).
- The communications are initialized.
- The content of the buffers (such as the character buffer) are cleared.
- The viewport is set to type 1.
- The cursor address mode is selected.
- The cursor and buffer addresses are set to (001,001).
- The U.S. ASCII character set is assigned to the G0 space and the special graphics character set is assigned to the G1 space.
- The characters are displayed in normal intensity, non-blinking, non-reverse, and non-underline.
- The default-field-attribute function is disabled.
- The read-modified-field mode is selected.
- The host-protect function is disabled.
- The write-null function is disabled.
- The reset-key attention is disabled.
- The print-key attention is disabled.
- The field-attribute visible-renditions function is enabled.

- The partition separator line is not displayed.
- The OIA divider line is effective.

The above initialization is called *power-on reset* and performed when one of the following occurs:

- The 3151 is powered on.
- The 3151 exits test mode.
- The Reset to Initial State command is received (the internal circuits are not checked).
- The operating mode is changed (the internal circuits are not checked).
- The machine mode is changed (the internal circuits are not checked).
- Reset Terminal is performed in the setup menu (the internal circuits are not checked).

Editing

This section describes the editing capabilities of the 3151. After entering data, you may often need to alter it, for example, to correct typing errors. You can simply edit the displayed data by overtyping, or by using keyboard functions to insert or delete characters. You can also add or delete lines by using *Ins Ln* or *Del Ln* key. In block or character mode, the editing result is displayed on the screen by **the 3151**, but this is not the case for echo mode.

In echo mode, the 3151 only sends the data that you entered to the host system but does not display it on the screen. Therefore, an application program on the host system should echo back the received data to the 3151 so that you can see the data on the screen. The 3151 provides the equivalent editing commands for insertions and deletions. An application program can use these commands to reflect the editing result on the screen in echo mode.

Editing includes various terminal operations. The following figure shows the various types of editing and what key or command can perform the operation.

Operation	Key	Command
Insert Character	Insert	Insert Character
Insert Line	Ins Ln	Insert Line
Delete Character	Delete	Delete Character
Delete Line	Del Ln	Delete Line
Erase Input	Er Inp	Erase Input
Erase to End of Field (or Line)	Erase EOF	Erase EOL/F
Erase to End of Page	Er EOP	Erase EOP

Figure 3-1. Operations, Associated Keys, and Commands

Differences in Operations by Keys and Commands

Generally, keys and commands perform the same functions with the following exceptions:

- Keys access the active partition and commands access the host partition.
- Keys use the screen's cursor position to determine the processed area; commands use the cursor address (when in cursor address mode) or the buffer address mode (when in buffer address mode) to determine the processed area.

Insert Operations

Insert operations are affected by the following parameters:

- Forcing Insert (selected by the Set Control 2 command or from the GENERAL menu)
- Insert Character (selected by the Set Control 3 command or from the KEYBOARD/PRINTER menu)
- Line Wrap (selected by the Set Control 3 command or from the GENERAL menu).

For ease of understanding, this section explains the insert operations when the Forcing Insert parameter is OFF. See "Forcing Insert Parameter" on page 3-13 for the description of the Forcing Insert parameter.

Insert Character Operation

< Using Insert Key >

When the Insert Character parameter is MODE, the 3151 enters insert mode when the *Insert* key is pressed; then you can insert characters. To exit this mode, press the *Reset* key or the *Insert* key again.

The following keys can also reset the insert mode:

- Send
- Send Line
- Sn Msg
- Print (if the print-key-attention function is enabled)
- Print Line (if the print-key-attention function is enabled)
- Pr Msg (if the print-key-attention function is enabled)
- PA1 - PA3
- F1 - F36 (if a function is not assigned)
- Clear.

In echo mode, the Insert Character response is sent to the host system when a character is inserted from the keyboard, but no local function (screen update) is performed.

In character mode, the Insert Character response is sent to the host system when a character is inserted from the keyboard, and the local function is performed.

When the Insert Character parameter is SPACE, the 3151 inserts a space character at the cursor position when the *Insert* key is pressed. The cursor does not move.

In echo mode, ESC P SP BS (P is an ASCII graphic character and the others are ASCII control characters) is sent to the host system when a character is inserted from the keyboard, but no local function is performed.

In character mode, ESC P SP BS is sent to the host system when a character is inserted from the keyboard, and the local function is performed.

< Using Insert Character Command >

The Insert Character command can insert any character at the cursor address (when in cursor address mode) or at the buffer address (when in buffer address mode).

Note: This command cannot select the insert mode.

How Line Wrap Affects Insert: The Line Wrap parameter affects the insert character operation as follows:

Note: When the Forcing Insert Character parameter is OFF, the Line Wrap parameter is assumed to be ON in block mode or in a formatted page.

- When the Line Wrap parameter is OFF in an unformatted page:

  Characters can be inserted up to *the end of the line* until there are no more null characters.

- When the Line Wrap parameter is ON in an unformatted page:

Characters can be inserted up to *the end of the page* until there are no more null characters.

- When the Line Wrap parameter is ON in a formatted page:

  Characters can be inserted up to *the end of the unprotected field* until there are no more null characters.

- When the Line Wrap parameter is OFF or the default-field-attribute function is enabled in a formatted page:

  Characters can be inserted up to *the end of the unprotected field* or *the end of the page*, whichever comes first, until there are no more null characters.

Note: If there is no space to insert a character or if the cursor is located on a field attribute character, the audible alarm sounds and WRONG PLACE is displayed in the operator information area. The Insert Character command does not display WRONG PLACE.

Insert Line Operation

In an unformatted page, the current line is replaced with a null line. The remaining lower lines and the previous current line move down one line when the *Ins Ln* key is pressed (or the Insert Line command is received).

In an unprotected field (in a formatted page), the current line is replaced with a null line. The remaining lower lines and the previous current line move down one line when the *Ins Ln* key is pressed (or the Insert Line command is received). The MDT bit is set on and the cursor moves to the first character position of the newly created line. You cannot insert a null line in a protected field.

In echo mode, the Insert Line response is sent to the host system when the *Ins Ln* key is pressed, but no local function is performed.

In character mode, the Insert Line response is sent to the host system when the *Ins Ln* key is pressed, and the local function is performed.

Note: If there is no space to insert a null line or if the cursor is located on a field attribute character, the audible alarm sounds and WRONG PLACE is displayed in the operator information area. The Insert Line command does not display WRONG PLACE.

Forcing Insert Parameter

This parameter affects the insert operations.

Note: When the Forcing Insert parameter is OFF, the Line Wrap parameter is assumed to be ON in block mode or in a formatted page. When the Forcing Insert parameter is not OFF, the Line Wrap parameter works as it is set.

Possible Values	Description
OFF	If there is no space to insert a character or a null line, the insert operation cannot be done.
LINE	If there is no space to insert a null line and an insert line operation is requested (for example, by the *Ins Ln* key), the current line is replaced with a null line and the remaining lower lines and the previous current line move down one line. The bottom line of the page in an unformatted page (or the bottom line of the field or page whichever comes first in a formatted page) is discarded. *Note:* If the cursor is located on an attribute character, the operation fails.

Possible Values	Description
CHARACTER	If there is no space to insert a character and an insert character operation is requested (for example, by the *Insert* key), a character can be inserted at the cursor position. However, • The last character of the current line is discarded when the Line Wrap parameter is OFF. • The last character in an unformatted page (or the last character of the field or page, whichever comes first, in a formatted page) is discarded when the Line Wrap parameter is ON.
BOTH	Enables the LINE and CHARACTER functions.

Delete Operations

This section describes the two types of delete operations when using the delete keys (operations when using the delete commands are similar).

Delete Character Operation

In an unprotected field or in an unformatted page, the character at the cursor position is deleted when the *Delete* key is pressed. The cursor does not move and the MDT bit for the unprotected field is set on. All remaining characters (to the right of the cursor in the same line or the same field, whichever ends first) move one position to the left and the last character position of the line or the field is filled with a null character.

In echo mode, the Delete Character response is sent to the host system when the *Delete* key is pressed, but no local function is performed.

In character mode, the Delete Character response is sent to the host system when the *Delete* key is pressed, and the local function is performed.

Note: If the cursor is located on a field attribute character or in a protected field, and you press the *Delete* key, the audible alarm sounds and WRONG PLACE is displayed in the operator information area. The delete character operation is not performed. The Delete Character command does not display WRONG PLACE.

Delete Line Operation

In an unformatted page, the current line is deleted when the *Del Ln* key is pressed. All trailing lines move up one line and a null line is created at the bottom of the page.

In an unprotected field (formatted page), the current line is deleted when the *Del Ln* key is pressed. All trailing lines in the unprotected field move up one line and a null line is created at the bottom of the field. The cursor moves to the first position of the same line and the MDT bit for the unprotected field is set on.

In echo mode, the Delete Line response is sent to the host system when the *Del Ln* key is pressed, but no local function is performed.

In character mode, the Delete Line response is sent to the host system when the *Del Ln* key is pressed, and the local function is performed.

Note: If the cursor is located on the line containing a field attribute character or in a protected field, and the *Del Ln* key is pressed, the audible alarm sounds and WRONG PLACE is displayed in the operator information area. The delete line operation is not performed. The Delete Line command does not display WRONG PLACE.

Erase Operations

Erase operations are classified into three types; erase input, erase to end of field (or line), and erase to end of page. This section describes the three types of erase operations.

Erase Input Operation

This operation is performed when the *Er Inp* key is pressed or the Erase Input command is received.

In an unformatted page, this operation converts all characters in the current page (partition) to null characters; the cursor (cursor address or buffer address in case of the Erase Input command) moves to the home position; tab stops are not cleared.

In a formatted page, this operation converts all characters in the unprotected fields of the current page to null characters; the MDT bits of all unprotected fields are reset off and the cursor moves to the first unprotected field. If there are no unprotected fields, only the cursor moves to the first position of the page.

Erase to End of Field (or Line) Operation

This operation is performed when the *Erase EOF* key is pressed or the Erase EOL/F command is received.

In an unformatted page, this operation converts all characters, from the cursor position (cursor address or buffer address in case of the Erase EOL/F command) to the end of the current line, to null characters; the cursor does not move and tab stops are not cleared.

If the cursor is located in an unprotected field of a formatted page, this operation converts all characters, from the cursor position to the end of the current line or to the end of the field (whichever comes first), to null characters; the MDT bit is set on and the cursor does not move.

Erase to End of Page Operation

This operation is performed when the *Er EOP* key is pressed or the Erase EOP command is received.

In an unformatted page, this operation converts all characters, from the cursor position (cursor address or buffer address in case of the Erase EOP command) to the end of the current page, to null characters; the cursor does not move and tab stops are not cleared.

In a formatted page, this operation converts all characters in the unprotected fields, from the cursor position (cursor address or buffer address in case of the Erase EOP command) to the end of the current page, to null characters; the MDT bits are not affected and the cursor does not move.

Clear Operation

The clear operation includes the following and is performed when the *Clear* key is pressed or the Clear command is received.

- The content of the active page (in which the cursor is located) including all attributes are converted to null characters.
- The cursor address is set to the first position of the page, but the buffer address remains unchanged when in cursor address mode.

  The buffer address is set to the first position of the page, but the cursor address remains unchanged when in buffer address mode.
- The Clear response is sent to the host system.
- The column tab stops are cleared.

Cancel Operation

The *Cancel* key (or Cancel command) can stop data transmission to the host system or to the optional device, or can reset a keyboard-lock condition.

When the *Cancel* key is pressed while the 3151 is processing the data to be transmitted to the host system, the ASCII CAN character, followed by a turnaround character is placed at the end of data characters and sent. This informs the host system that a cancel operation was performed.

When the *Cancel* key is pressed after the data has been sent to the host system, no operation is performed.

When the *Cancel* key is pressed while the 3151 is processing the data to be transmitted to the optional device, the operation ends at this point and the non-processed data is discarded.

The *Cancel* key also removes the messages; KEYS LOCKED, AUX NOT READY, and AUX BUSY.

Transmitting and Receiving Data

This section describes data transmissions among the host system, the 3151, and the optional device attached to the 3151.

Send/Read Operations

Data transmission to the host system depends on the following parameters:

- Operating mode; block, character, or echo
- Formatted or unformatted page
- Send null suppress (selected by the Set Control 4 command or from the COMMUNICATION menu).

When operating in block mode, the following parameters also affect data transmission:

- Send data format; AID LTA or Text LTA (selected by the Set Control 4 command)
- Read-modified-field or read-unprotected-field mode (selected by the Enable or Disable Read Unprotected Field command).

  Note: This parameter is effective only in a formatted page.

Note: Data sent to the host system may require data conversion. The data conversion follows the rules described in "How Characters Are Sent to the Host System" on page 3-30.

Data transmission started by send keys is called *a send operation.* Send keys include:

- Send (Page)
- Send Line
- Sn Msg (Send Message).

Note: In character or echo mode, each send key generates its own unique AID code followed by the turnaround character (selected by the Turnaround Character parameter). See Appendix C, "AID Codes Generated by Keys" for AID codes.

Data transmission started by read commands is called *a read operation.* Read commands include:

- Read Page
- Read Line
- Read Message
- Read All.

Types of Operations: Send and read operations are classified into four types according to their associated areas.

A send page or read page operation sends/reads data in the page, *a send line or read line operation* sends/reads data in the current line, and *a send message or read message operation* sends/reads data in the area specified by the send mark. (See "Send Mark" on page 3-28 for creating the send mark.) Data is handled in send and read operations in the same way.

A read operation started by the Read All command reads all data in the host partition, regardless of the MDT bit settings.

The following figure shows the various types of send and read operations, and what key or command can perform the operation.

Operation	Key	Command
Send/Read Page	Send	Read Page
Send/Read Line	Send Line	Read Line
Send/Read Message	Sn Msg	Read Message
Read All	-	Read All

Figure 3-2. Operations, Associated Keys, and Commands

Differences in Operations by Keys (Send) and Commands (Read): Generally, keys and commands (except the Read All) perform the same functions with the following exceptions:

- Keys access the active partition and commands access the host partition for reading and sending data to the host system.
- Keys use the screen's cursor position to determine the send area; commands use the cursor address (when operating in cursor address mode) or the buffer address (when operating in buffer address mode) to determine the read area.

The following pages describe the send and read operations in block mode. The read operations in character or echo mode are also similar to read operations in block mode.

Send (Read) Operations in a Formatted Page

The 3151 can send one of the following fields to the host system (if the Send Data Format parameter is Text LTA):

- A modified field (MDT bit is set on)
- An unprotected field
- All fields.

Which type of field to be sent depends on which mode is selected; read-modified-field or read-unprotected-field mode. When power is turned on, the read-modified-field mode is selected. The modified fields will be sent to the host system in this mode when a read or send operation is requested.

This mode is changed to the read-unprotected-field mode by the Enable Read Unprotected Field command. The unprotected fields will be sent to the host system in this mode when a read or send operation is requested.

The Disable Read Unprotected Field command can be used to change this mode back to the read-modified-field mode.

Note: If the Send Data Format parameter is AID LTA, the associated AID code is sent to the host system when one of the send keys is pressed.

When the Read All command is received, all fields are sent to the host system.

Data Stream Format

Modified Field Data: The following shows the format of the modified field data, which is sent to the host system in read-modified-field mode when a read or send operation is requested.

SBA	Field Characters

SBA is the Set Buffer Address response that specifies the starting position of the field characters (next to the field-attribute-character position).

If the column address is greater than 95, XSBA (Extended Set Buffer Address response) is used instead of SBA. When the field contains only null characters and the Send Null Suppress parameter is ON, no field characters are sent.

Unprotected Field Data: The following shows the format of an unprotected field data, which is sent to the host system in read-unprotected-field mode when a read or send operation is requested.

SFA is the Set Field Attribute response of the unprotected field.

When the field contains only null characters and the Send Null Suppress parameter is ON, no field characters are sent.

Data Stream Format for Send (Read) Operations: The following shows the data stream format for a send or read operation.

Field Data is one of the modified field data (in read-modified-field mode), the unprotected field data (in read-unprotected-field mode), and all fields (for the Read All command); n is the total number of the field data; LTA is the turnaround character.

Note: If the last field wraps to the first position in the page, the first data in the page is sent as a part of the last field.

Send (Read) Operations in an Unformatted Page

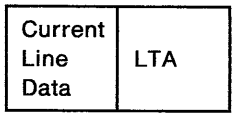
Data Stream Format: The data stream format depends on the Send Null Suppress parameter.

Note: All data on the screen and LTA are sent to the host system in response to the Read All command.

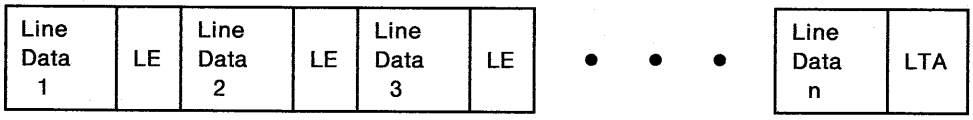
When the Send Null Suppress parameter is OFF: The following shows the format for send (read) page and send (read) message operations:

Line Data contains the content of each line, n is the total number of lines, and LTA is the turnaround character.

The following shows the format for a send (read) line operation:



When the Send Null Suppress parameter is ON: The following shows the format for send (read) page and send (read) message operations:

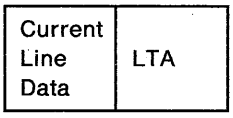


Line Data contains the content of each line, n is the total number of lines, and LTA is the turnaround character, and LE (line end character) is one of the following:

- CR when the Turnaround Character parameter is not CR, and the Auto LF parameter is ON
- CR/LF when the Turnaround Character parameter is not CR, and the Auto LF parameter is ON
- RS when the Turnaround Character parameter is CR.

Note: LE is also applied to a null line. However, the associated line data is omitted.

The following shows the format for a send (read) line operation:



Send Mark

In a send message or read message operation, the data area is specified by the send mark (⏏).

A send mark can be created by the Write Send Mark command or from the keyboard as follows:

1. Position the cursor to any place one line above the data that you want to send.

2. Press the *ESC* key; then press the *E* key while holding down the *Shift* key.

   The send mark (⏏) is specified and appears at the cursor position.

When the send mark is created, the data area ranges from the line below the send mark to the cursor position.

Notes:

1. *If no send mark has been specified, data from the top of the page to the cursor position is sent.*

2. *If the send mark is located after the cursor position and there is more than one field attribute character, data from the send mark to the cursor position (wrapped to the top of the page) is sent.*

3. *If the send mark is located after the cursor position and there are no field attribute characters, data from the top of the page to the cursor position is sent.*

4. *If the "Lock Keyboard and Keep MDT Bit" parameter (selected by the Set Control 4 command) is OFF, the cursor moves to the first position of the next line after the send (read) operation is completed. The related MDT bits are reset off.*

5. *If the "Lock Keyboard and Keep MDT Bit" parameter is ON, the keyboard is locked after the send (read) operation is completed. The cursor does not move until the "Reset Keyboard Lock and MDT Bit" command is received. When*

the "Reset Keyboard Lock and MDT Bit" command is received or the Cancel key is pressed, the keyboard lock condition is released, the cursor moves to the first position of the next line, and the related MDT bits are reset off.

How Characters Are Sent to the Host System

When a send or read operation is requested, characters are sent to the host system in the following ways:

- ASCII graphic (X'21' through X'7E') and special graphic (line-drawing, superscripts, and subscripts) characters are sent to the host system as they are.

  The 3151 places the Select Character Set G0/G1 response, and/or the SI or SO character (in 7-bit mode) in front of the character, if changing the character set or changing the space to be used is needed.

  Example: When the U.S. ASCII character set is assigned to the G0 space and the special graphics character set is assigned to the G1 space (default assignment), the 3151 does not generate the Select Character Set G0/G1 response. It places the SO character in front of the line-drawing, superscript, or subscript character when the previous character is not in the G1 space. The 3151 places the SI character after the previous character when the character in the G0 space is selected again.

- ASCII null character (X'00'):

  - If the Send Null Suppress parameter is ON, the trailing null characters are removed. Other null characters are converted to space characters (X'20').

  - If the Send Null Suppress parameter is OFF, all null characters are converted to space characters.

- ASCII control characters (X'01' through X'20' and X'7F') are sent to the host system as they are.

- Field attributes are sent in the format of the Set Field Attribute response.

- Character attributes are ignored.

- Reverse question mark (؟) is converted to a SUB character.

- Send mark (⏏) is handled as a null character.

Print Operations

Data transmission to the optional device is called *a print operation* (in most cases, a printer is connected to the auxiliary port). To enable the print operations from the keyboard, the print-key attention should be disabled; otherwise the AID code will be sent to the host system when one of the print keys is pressed. See "Enable/Disable Print Key Attention Commands" on page 6-36 for the description of the print-key attention.

Note: Data sent to the optional device may require data conversion. The data conversion follows the rules described in "How Characters are Sent to the Optional Device" on page 3-35.

Types of Operations: Print operations are classified into four types according to their associated areas; print screen, print page (viewport), print line, and print message.

The following figure shows the various types of print operations, and what key or command to use to perform the operation.

Operation	Key	Command
Print Screen	Print with Shift	Print Screen
Print Page (Viewport)	Print	Print Viewport
Print Line	Print Line	Print Line
Print Message	Pr Msg	Print Message

Figure 3-3. Operations, Associated Keys, and Commands

Differences in Operations by Keys and Commands: Generally, keys and commands perform the same functions with the following exceptions:

- Keys access the active partition and commands access the host partition for printing data on the optional device.
- Keys use the screen's cursor position to determine the print area; commands use the cursor address (when operating in cursor address mode) or the buffer address (when operating in buffer address mode) to determine the print area.

Print Screen Operation

Sends the content of the screen to the optional device when the *Print* key is pressed while holding down the *Shift* key (or the Print Screen command is received).

Print Page (Viewport) Operation

Sends the content of the active page to the optional device when the *Print* key is pressed (or the Print Viewport command is received).

Print Line Operation

Sends the content of the current line to the optional device when the *Print Line* key is pressed (or the Print Line command is received).

Print Message Operation

Sends data, from the line below the send mark (⌂) to the cursor position, to the optional device when the *Pr Msg* key is pressed (or the Print Message command is received).

Notes:

1. *If no send mark has been specified, data from the top of the page to the cursor position is sent.*

2. *If the send mark is located after the cursor position and there is more than one field attribute character, data from the send mark to the cursor position (wrapped to the top of the page) is sent.*

3. *If the send mark is located after the cursor position and there are no field attribute characters, data from the top of the page to the cursor position is sent.*

A send mark can be created by the Write Send Mark command or from the keyboard as follows:

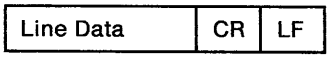
1. Position the cursor to any place one line above the data that you want to print.

2. Press the *ESC* key; then press the *E* key while holding down the *Shift* key.

   The send mark (⏏) is specified and appears at the cursor position.

Data Stream Format

In a print operation, the CR and LF characters are always placed at the end of each line as follows:



How Characters are Sent to the Optional Device

The characters sent to the optional device depend on the Characters parameter (KEYBOARD/PRINTER menu). When the Characters parameter is NATIONAL, the following are converted to a space character (X'20') and sent to the optional device:

- Line-drawing characters
- Superscripts and subscripts
- Field and character attributes
- Reverse question mark (⸮)
- Send mark (⌂).

Only the ASCII graphic characters (X'21' through X'7E') can be printed. The ASCII control characters (X'00' through X'1F' and X'7F') are also converted to the space characters.

When the Characters parameter is ALL, the characters are handled as follows:

- ASCII graphic (X'21' through X'7E'), subscripts, superscripts, and line-drawing characters are sent to the optional device as they are.

  Whenever an ASCII graphic character in a character set different from that of the previously transmitted character is received in the data stream, the Select G0/G1 response and/or the SI (for G0) or SO (for G1) control character is placed in front of that character.

- Trailing ASCII null characters (X'00') are removed.

- ASCII control characters (X'01' through X'1F' and X'7F') are converted to space characters.

- Field attributes are sent in the format of the Set Character Attribute command (ESC 4 pa).

  Note: Field attributes are converted to the character attributes. Numeric, protected, blink, or MDT attributes are ignored.

- Character attributes are sent in the format of the Set Character Attribute command.
- Reverse question marks (⸮) are converted to space characters.
- Send mark (⏏) is handled as a null character.

At the beginning of the print operation, the 3151 issues the Select Character Set command specifying:

- U.S. ASCII for the G0 space
- Special graphics for the G1 space
- SI character in a 7-bit mode.

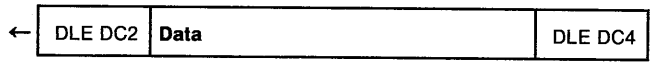
Then, the Set Character Attribute command with normal display is placed at the beginning of the data stream.

Pass-through Operations

The 3151 can bypass data sent from the host system to the optional device on the auxiliary port and data sent from the optional device to the host system. The former is called *a outbound pass-through operation* and the latter is called *a inbound pass-through operation.*

Note: Inbound pass-through operation is not supported for the Model 11.

To perform these operations, two DLE sequences are used; DLE DC2 (header) and DLE DC4 (trailer). The DLE DC2 should be placed at the beginning of the data stream and the DLE DC4 should be placed at the end of the data stream as shown below.



Note: When a communication error occurs in the pass-through operation, the SUB character is sent to the host system or to the optional device.

Outbound Pass-through Operation

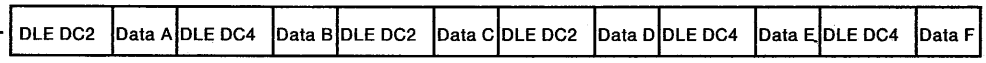
When data, with DLE DC2 as a header and the DLE DC4 as a trailer, is sent to the 3151 from the host system, the 3151 does the following:

1. When the header (DLE DC2) is detected at the beginning of the data stream, the 3151 begins a pass-through operation. It removes the header and sets a counter to 1.

2. The data is passed to the optional device.

3. When the trailer (DLE DC4) is detected at the end of the data stream, the 3151 decreases the content of the counter by 1. When the content of the counter becomes 0, the trailer is removed and the pass-through operation ends.

When the optional device with the pass-through capability (such as the 3151) is attached on the auxiliary port, the data can be also bypassed to the optional device on the auxiliary port of the second 3151. Shown below is the example of the data with three headers and three trailers each.



The 3151 handles this data as follows:

Note: In the following description, it is assumed that the 3151 is attached on the auxiliary port.

1. When the header (DLE DC2) is detected at the beginning of the data stream, the 3151 begins a pass-through operation. It removes the header and sets a counter to 1.

2. Data A is passed to the second 3151.

3. When the trailer (DLE DC4) is detected, the 3151 decreases the content of the counter by 1. The content of the counter becomes 0 and the trailer is removed and the pass-through operation ends.

4. The 3151 receives data B.

5. The 3151 detects and removes the second DLE DC2, and sets the counter to 1 (a pass-through operation starts again).

6. Data C is then passed to the second 3151.

7. The 3151 detects the third DLE DC2, but does not remove it. (Because the DLE DC2 is only removed when the content of the counter is 0.)

8. The 3151 increases the content of the counter by 1 (now, it becomes 2) and passes the third DLE DC2 to the second 3151.

9. Data D is passed to the second 3151.

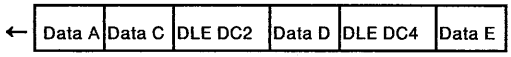
10. The 3151 detects the second DLE DC4 and decreases the content of the counter by 1 (now, it becomes 1). The second DLE DC4 is not removed because the content of the counter is not 0.

11. The second DLE DC4 and data E are passed to the second 3151.

12. The 3151 detects the third DLE DC4 and decreases the content of the counter by 1 (now, it becomes 0). The third DLE DC4 is removed and the pass-through operation ends.

13. The 3151 receives data F.

The data that the second 3151 receives are:



Data D is passed to the optional device on the second 3151.

Inbound Pass-through Operation

The 3151 always places the DLE DC2 at the beginning and the DLE DC4 at the end of the data from the optional device and passes it to the host system.

Note: The inbound pass-through is enabled by the Set Control 6 command.

Handling of DC1 and DC3 in Pass-through Data Stream

The DC1 (XON) and DC3 (XOFF) in the inbound and outbound pass-through data streams are removed by the 3151; the data following DC1 or DC3 continues to be sent to the host system or the optional device. After the 3151 removes the DC3, however, pass-through data is retained in the 3151 until the 3151 receives the DC1 in the pass-through data stream.

Chapter 4. Keyboard Functions

This chapter describes the function of each key. Figure 4-1 shows the layout of the 3151 keyboard with numeric keypad (for Models 31 and 41) for the U.S.; Figure 4-2 on page 4-2 shows the layout of the 3151 keyboard without numeric keypad (for the Model 11) for the U.S. The keyboard includes alphanumeric keys, numeric keypad keys, and control-function keys. The keyboard functions are explained in alphabetical order.

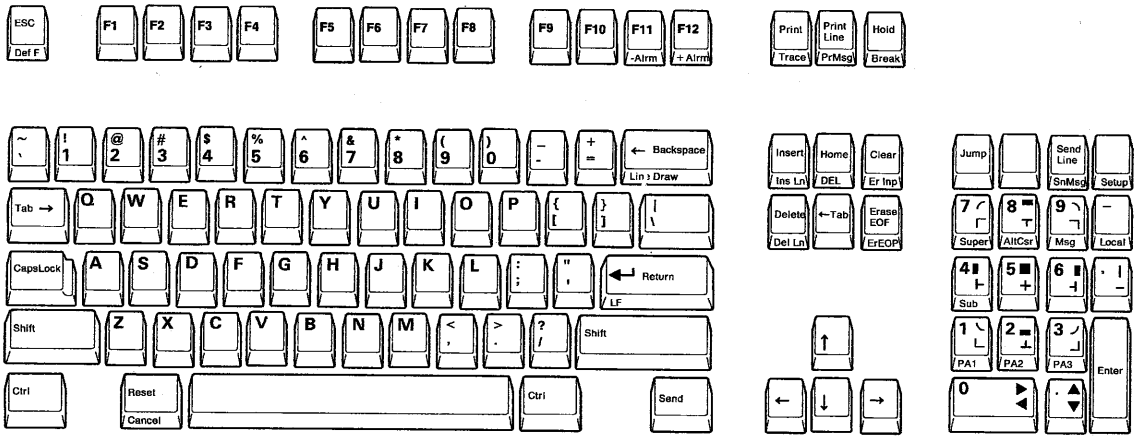


Figure 4-1. 3151 Keyboard with Numeric Keypad

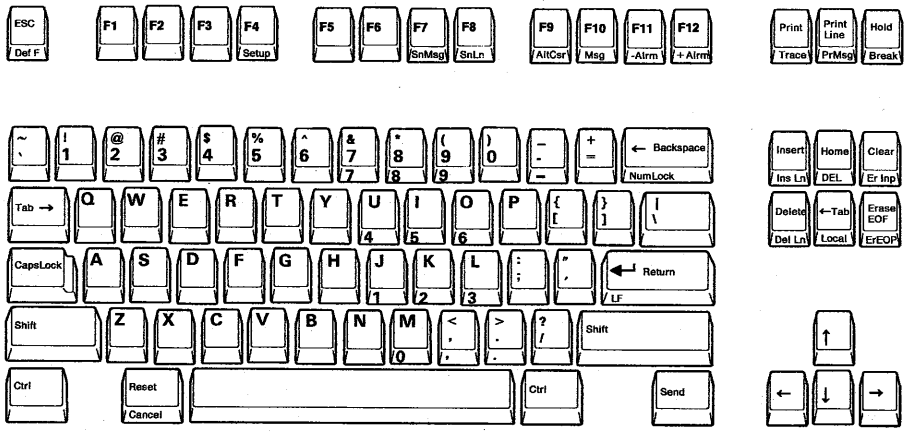


Figure 4-2. 3151 Keyboard without Numeric Keypad

Figure 4-3 summarizes the 3151 keyboard functions. Generally, the function labeled on the top of the key is performed when the key is pressed alone. The function labeled on the front of the key is performed when the key is pressed while holding down the *Ctrl* key.

Notes:

1. ***Jump, Line Draw, PA1 - PA3, Sub,*** *and* ***Super*** *keys are not supported for the keyboard without numeric keypad.*

2. ***Num Lock*** *key is not supported for the keyboard with numeric keypad.*

Key	Function	Related Command
−Alrm +Alrm	Each time the *−Alrm* key is pressed while holding down the *Ctrl* key, the volume of the audible alarm decreases. Each time the *+Alrm* key is pressed while holding down the *Ctrl* key, the volume of the audible alarm increases. The alarm-level setting is saved for later use.	
Alt Csr	Selects among four cursor types: block, blinking bar, blinking block, and bar. The selected cursor type is saved, and used the next time power is turned on. *Note:* Blinking bar and blinking block are not supported for the Model 11.	
← Backspace	Moves the cursor to the left one position at a time.	

Figure 4-3 (Part 1 of 9). 3151 Keyboard Functions

Key	Function	Related Command
Break	Generates the break signal when the 3151 uses PRTS or IPRTS for the line control, or operates in echo mode. By using this key, you can cause the host system to wait before sending data to the 3151.	
Cancel	Ends data transfer to the host system or the optional device on the auxiliary port. Also resets the "KEYS LOCKED," "AUX NOT READY," or "AUX BUSY" condition. Using this key, you can cancel either the print operation or the data transmission to the host system.	Cancel
Caps Lock	Locks the keyboard in up-shift (for alphabetic keys only) mode. Pressing this key again resets up-shift mode.	
Clear	Erases all characters in the active page where the cursor is located, and moves the cursor to the first position of the page. Also clears the field attributes and the tab stops, and resets insert mode.	Clear
Ctrl (Control)	Selects the function indicated on the front of the other selected keys.	
↑ ↓ ← → (Cursor Move)	Moves the cursor in the direction of the arrow.	Cursor Move
Def F	Enters define-function-key mode. See "Redefining Program Function Keys" on page 3-3 on how to redefine function keys.	Load Programmable Function Key; Set All Default Function Keys; Set Default Function Key

Figure 4-3 (Part 2 of 9). 3151 Keyboard Functions

Key	Function	Related Command
DEL	In character or echo mode, the 3151 sends an ASCII DEL character to the host system.	
Delete	Deletes the character in an unprotected field or in an unformatted page at the current cursor position. If the cursor is located on a field attribute character or in a protected field, the audible alarm sounds and WRONG PLACE is displayed in the operator information area.	Delete Character
Del Ln	Deletes the line where the cursor is located. If a field attribute character exists in the current line, or if the current field is protected, the audible alarm sounds and WRONG PLACE is displayed in the operator information area.	Delete Line
Enter	Works as the *Send* key when SEND is selected or works as the *Return* key when RETURN is selected for the Enter parameter.	
Er Inp	Erases all characters in the active page and moves the cursor to the first position when the page is unformatted. Erases all unprotected characters in the active page and moves the cursor to the first position of the first unprotected field when the page is formatted.	Erase Input
Erase EOF	Erases all characters from the cursor position to the end of the line when the page is unformatted. Erases all characters from the cursor position to the end of the line or to the end of the field, whichever comes first, when the page is formatted. If the cursor is located on a field attribute character or in a protected field, the audible alarm sounds and WRONG PLACE is displayed in the operator information area.	Erase EOL/F

Figure 4-3 (Part 3 of 9). 3151 Keyboard Functions

Key	Function	Related Command
Er EOP	Erases all characters from the cursor position to the end of the page when the page is unformatted. Erases all unprotected characters from the cursor position to the end of the page when the page is formatted.	Erase EOP
ESC	Generates an ASCII ESC (escape) character. The ESC character followed by appropriate alphanumeric characters forms an ESC sequence, which provides unique 3151 functions in addition to the standard ASCII control functions.	
F1 - F12 (Function)	Sends the default ESC sequence (if you have not redefined a function key) to the host system or generates a character string that is assigned to each function key. Works as F13 through F24 when pressed with the *Shift* key. Works as F25 through F36 when pressed with the *Shift* and *Ctrl* keys. See "Redefining Program Function Keys" on page 3-3 for redefining function keys.	
Hold	Stops the screen from being updated by the host system during normal operation. The incoming data will be stored in the 3151. If the 3151's data buffer becomes close to full, an XOFF character will be sent to the host system. Pressing this key again starts the screen update.	
Home	Moves the cursor to the home position (first unprotected character position) of the active page.	Cursor Home

Figure 4-3 (Part 4 of 9). 3151 Keyboard Functions

Key	Function	Related Command
Insert	Places the keyboard in insert mode and allows characters to be inserted in a field when MODE is selected, or inserts a space character when SPACE is selected for the Insert Character parameter. Pressing this key again or pressing the *Reset* key exits insert mode. If there is no space to insert a character (when the Forcing Insert parameter is OFF) or the cursor is in a protected field, the audible alarm sounds and WRONG PLACE is displayed in the operator information area.	Insert Character
Ins Ln	Inserts a null line where the cursor is located. If there is no space to insert a line (when the Forcing Insert parameter is OFF), or the cursor is in a protected field, or a field attribute character exists in the current line, the audible alarm sounds and WRONG PLACE is displayed in the operator information area.	Insert Line
Jump	Moves the cursor to the next partition.	Jump Partition
LF	Moves the cursor to the first character of the next line when New Line is selected, or moves the cursor to the same position of the next line when Line Feed is selected for the ASCII LF Character parameter (Set Control 3 command).	
Line Draw	Enters line-drawing mode. Enables the numeric keypad for line drawing. Pressing this key again exits this mode.	
Local	Enters local mode, in which almost all communications with the host system are disabled. Pressing this key again exits local mode.	

Figure 4-3 (Part 5 of 9). 3151 Keyboard Functions

Key	Function	Related Command
Msg	Each time the *Msg key* is pressed, the content of the operator information area (OIA) changes. At first the OIA contains no indicators; the first time the *Msg* key is pressed, an operator message appears; the next time the *Msg* key is pressed, a host message appears. The nature of the OIA is saved for later use. The Model 11 does not display host messages.	Display Machine Status; Display Host Message
Num Lock	Places the keyboard in numeric lock mode and allows characters indicated on the front of the selected keys. Characters include 0 through 9, comma (,), period (.), and minus (-). You can also enter characters indicated on the top of the keys with or without *Shift* key. They include 0 through 9, comma (,), period (.), minus (-), plus (+), asterisk (*), and slash (/). Pressing this key again exits numeric lock mode.	
Print	Sends the content of the current page to the optional device on the auxiliary port. Sends the content of the screen when pressed together with the *Shift* key. (Page and screen means the same thing for the Model 11 because it does not provide the split screen function.) The data to be sent depends on the Characters parameter. See page "Characters for Auxiliary Port" on page 7-38 for more information. Sends the Print (or Print Screen) AID followed by an LTA to the host system if the print key attention is enabled.	Print Screen; Print Viewport

Figure 4-3 (Part 6 of 9). 3151 Keyboard Functions

Key	Function	Related Command
Print Line	Sends the content of the current line to the optional device on the auxiliary port. The data to be sent depends on the Characters parameter. See page "Characters for Auxiliary Port" on page 7-38 for more information. Sends the Print Line AID followed by an LTA to the host system if the print key attention is enabled.	Print Line
Pr Msg	In block mode, the 3151 sends data from the line below the send mark (⌂) to the cursor position, to the optional device on the auxiliary port. The send mark can be specified by pressing the *ESC* key; then pressing the *E* key while holding down the *Shift* key. If no send mark is specified, data from the top of the screen to the cursor position is sent. The data to be sent depends on the Characters parameter. See page "Characters for Auxiliary Port" on page 7-38 for more information. Sends the Print Message AID followed by an LTA to the host system if the print key attention is enabled.	Print Message
PA1 - PA3	Sends the default ESC sequence to the host system:	
Reset	Resets superscript, subscript, and insert modes. Also removes the error indications displayed in the operator information area. Sends the Reset AID followed by an LTA to the host system if the reset key attention is enabled.	
↵Return	Moves the cursor to the first character of (1) the current line, (2) the next line, or (3) the line after the next line, depending on the Auto LF and New Line parameters.	

Figure 4-3 (Part 7 of 9). 3151 Keyboard Functions

Key	Function	Related Command
Send	In block mode, the 3151 sends the content of the active page to the host system when PAGE is selected, or sends the content of the current line to the host system when LINE is selected for the Send parameter. The data to be sent depends on the Send Data Format parameter. In character or echo mode, the 3151 sends the Send AID followed by an LTA to the host system.	Read Page; Read Line
Send Line	In block mode, the 3151 sends the content of the current line to the host system when PAGE is selected, or sends the content of the current page to the host system when LINE is selected for the Send parameter. The data to be sent depends on the Send Data Format parameter. In character or echo mode, the 3151 sends the Send Line AID followed by an LTA to the host system.	Read Line; Read Page
Sn Msg	In block mode, the 3151 sends data from the line below the send mark (⌂) to the cursor position to the host system. The send mark can be specified by pressing the *ESC* key; then pressing the *E* key while holding down the *Shift* key. If no send mark is specified, data from the top of the screen to the cursor position is sent. The data to be sent depends on the Send Data Format parameter. In character or echo mode, the 3151 sends the Send Message AID followed by an LTA to the host system.	Read Message
Setup	Enters setup mode to define the setup values. See "How to Define Setup Values Using Menus" on page 7-10 for more information.	Set Control
Shift	Enables keyboard up-shift.	
Sub	Allows subscripts ($_0$ - $_9$) to be entered when used together with the numeric keys.	

Figure 4-3 (Part 8 of 9). 3151 Keyboard Functions

Key	Function	Related Command
Super	Allows superscripts (^{0} - ^{9}) to be entered when used together with the numeric keys.	
Tab →	Moves the cursor to the next column tab stop when the page is unformatted. Moves the cursor to the first character of the next unprotected field when FIELD is selected for the Tab parameter and the page is formatted. Moves the cursor to the next column tab when COLUMN is selected for the Tab parameter and the page is formatted. Works as the ← *Tab* key when pressed with the *Shift* key.	
←Tab	Performs the same operation as the *Tab* → key, except the direction (*previous* instead of next).	
Trace	Enters trace mode. In trace mode, data from the host system is transferred to the optional device on the auxiliary port without data conversion while displaying the same data on the screen. Pressing this key again exits trace mode.	Begin/End Outbound Trace

Figure 4-3 (Part 9 of 9). 3151 Keyboard Functions

Chapter 5. Operator Messages

This chapter describes the messages that are displayed in the operator information area (OIA), which is the bottom line of the screen. Operator messages include:

- The operating status of the 3151
- The communication status
- Warning message if a problem is detected.

The OIA is not displayed when you power-on the 3151 the first time after installation. You can turn on the indication by using the *Msg* key. The OIA can also display a host message (not supported for the Model 11). To display an operator message or a host message, or not to display the OIA can be selected by the Display Machine Status or Display Host Message command from the host system, or using the *Msg* key from the keyboard. The nature of the OIA is saved for later use.

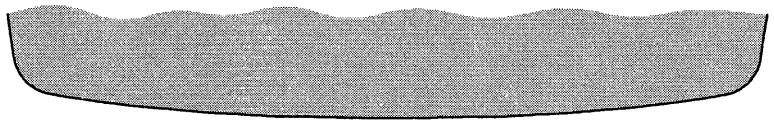


Figure 5-1. Operator Information Area

Operator Messages

Figure 5-2 lists the 3151 operator messages for IBM 3151 and IBM 3101 emulation modes. The operator messages are shown in alphabetical order.

Note: DRAW, SUBSCRIPT, *and* SUPERSCRIPT *are not displayed for the Model 11.*

NUM *is not displayed for the Models 31 and 41.*

If two or more error messages exist, the message with the higher priority is displayed. Messages are displayed in the following order:

1. PROBLEM IN VIDEO ELEMENT OR KEYBOARD
2. PROBLEM IN KEYBOARD
3. COMM NOT READY 2
4. COMM NOT READY 1
5. AUX NOT READY
6. HOST BUSY
7. AUX BUSY
8. HOLD SCREEN
9. SENDING
10. RECEIVING
11. PRINTING
12. KEYS LOCKED
13. INVALID KEY
14. WRONG PLACE
15. KEYBOARD ERROR
16. NUMERIC.

Message	Description
AUX BUSY	Appears when an XOFF condition occurs in the optional device on the auxiliary port. This message disappears when the XOFF condition is removed. *Note:* This message also disappears if you press the *Cancel* key, however any remaining data is discarded.
AUX NOT READY	Appears when an operator or an application program tries to send data to the optional device on the auxiliary port while the optional device is not ready to operate (DTR signal of the optional device is off). This message disappears when (1) the optional device becomes ready or (2) you press the *Cancel* key. Check the optional device (may not be powered-on or not attached).
BLOCK	Shows that the 3151 is operating in block mode.
CAPS	Appears when the *Caps Lock* key is pressed and shows that the caps-lock mode is selected. This message disappears when the *Caps Lock* key is pressed again.
CHAR	Shows that the 3151 is operating in character mode.
COMM NOT READY 1	Appears when the CTS (clear to send) signal is not sent from the host system (or modem) while the DTR (data terminal ready) signal is turned on and the DSR (data set ready) signal is present on the main port. *Note:* This message does not appear if IPRTS is selected for the line control because the CTS and DSR signals are assumed to be on in IPRTS.

Figure 5-2 (Part 1 of 5). 3151 Operator Messages

Message	Description
AUX BUSY	Appears when an XOFF condition occurs in the optional device on the auxiliary port. This message disappears when the XOFF condition is removed. *Note:* This message also disappears if you press the *Cancel* key, however any remaining data is discarded.
AUX NOT READY	Appears when an operator or an application program tries to send data to the optional device while the optional device is not ready to operate (DTR signal of the optional device is off). This message disappears when (1) the optional device becomes ready or (2) you press the *Cancel* key. Check the optional device (may not be powered-on or not attached). *Note:* This message does not appear when the Monitor Printer Status (set by the Set Control 7 command) is "No Monitor."
BLOCK	Shows that the 3151 is operating in block mode.
CAPS	Appears when the *Caps Lock* key is pressed and shows that the caps-lock mode is selected. This message disappears when the *Caps Lock* key is pressed again.
CHAR	Shows that the 3151 is operating in character mode.
COMM NOT READY 1	Appears when the CTS (clear to send) signal is not sent from the host system (or modem) while the DTR (data terminal ready) signal is turned on and the DSR (data set ready) signal is present on the main port. *Note:* This message does not appear if IPRTS is selected for the line control because the CTS and DSR signals are assumed to be on in IPRTS.

Figure 5-2 (Part 1 of 5). 3151 Operator Messages

Message	Description
COMM NOT READY 2	Appears when the DTR signal is turned on and the DSR signal is not present on the main port. *Note:* This message does not appear if IPRTS is selected for the line control because the CTS and DSR signals are assumed to be on in IPRTS.
CONTROL	Appears when the *Ctrl* key is pressed and held down.
DRAW	Appears when the *Line Draw* key is pressed while holding down the *Ctrl* key and shows that the line-drawing mode is selected. This message disappears when the *Line Draw* key is pressed while holding down the *Ctrl* key in line-drawing mode.
ECHO	Shows that the 3151 is operating in echo mode.
HOLD SCREEN	Appears when the *Hold* key is pressed and shows that the screen update is suspended. This message disappears when the *Hold* key is pressed again.
HOST BUSY	Appears when an XOFF condition occurs in the host system. This message disappears when the 3151 receives an XON character.
INSERT	Appears when the *Insert* key is pressed and shows that the insert mode is selected. This message disappears when the *Insert* key is pressed again or the *Reset* key is pressed. *Note:* This message does not appear when SPACE is selected for the Insert Character parameter.
INVALID KEY	Appears when you press any invalid key (for example, when you try to enter a command with wrong syntax from the keyboard). This message disappears when any valid key is pressed.

Figure 5-2 (Part 2 of 5). 3151 Operator Messages

Message	Description
COMM NOT READY 2	Appears when the DTR signal is turned on and the DSR signal is not present on the main port. *Note:* This message does not appear if IPRTS is selected for the line control because the CTS and DSR signals are assumed to be on in IPRTS.
CONTROL	Appears when the *Ctrl* key is pressed and held down.
DRAW	Appears when the *Line Draw* key is pressed while holding down the *Ctrl* key and shows that the line-drawing mode is selected. This message disappears when the *Line Draw* key is pressed while holding down the *Ctrl* key in line-drawing mode.
ECHO	Shows that the 3151 is operating in echo mode.
HOLD SCREEN	Appears when the *Hold* key is pressed and shows that the screen update is suspended. This message disappears when the *Hold* key is pressed again.
HOST BUSY	Appears when an XOFF condition occurs in the host system. This message disappears when the 3151 receives an XON character.
INSERT	Appears when the *Insert* key is pressed and shows that the insert mode is selected. This message disappears when the *Insert* key is pressed again or the *Reset* key is pressed. *Note:* This message does not appear when SPACE is selected for the Insert Character parameter.
INVALID KEY	Appears when you press any invalid key (for example, when you try to enter a command with wrong syntax from the keyboard). This message disappears when any valid key is pressed.

Figure 5-2 (Part 2 of 5). 3151 Operator Messages

Message	Description
KEYBOARD ERROR	Appears when any key is pressed and a keyboard scan code error or keyboard overrun condition occurs. This message disappears when any valid key is pressed. *Note:* You should retry the operation because the data may be discarded.
KEYS LOCKED	Appears when the Keyboard Lock command is received and shows that the keyboard is locked. This message disappears when the Keyboard Unlock command is received or you press the *Cancel* key.
LOCAL	Shows that the 3151 is operating in local mode. The 3151 enters local mode from any of the operating modes (block, character, or echo) when the *Local* key is pressed while holding down the *Ctrl* key, and returns to the previous operating mode when the *Local* key is pressed while holding down the *Ctrl* key.
NUM	Appears when the *Num Lock* key is pressed while holding down the *Ctrl* key and shows that the numeric-lock mode is selected. This message disappears when the *Num Lock* key is pressed while holding down the *Ctrl* key in numeric-lock mode.
NUMERIC	Appears when the cursor is located in an unprotected numeric field.
PRINTING	Appears when data is being sent to the optional device on the auxiliary port.
PROBLEM IN KEYBOARD	Appears when a problem is detected in the keyboard. Refer to *IBM 3151 ASCII Display Station Guide to Operations.*
PROBLEM IN VIDEO ELEMENT OR KEYBOARD	Appears when a problem is detected in the video element or keyboard. Refer to *IBM 3151 ASCII Display Station Guide to Operations.*

Figure 5-2 (Part 3 of 5). 3151 Operator Messages

Message	Description
RECEIVING	Appears when data is being received from the host system. *Note:* This message does not appear if IPRTS or PRTS is selected for the line control.
SENDING	Appears when data is being sent to the host system. *Note:* This message does not appear if IPRTS or PRTS is selected for the line control.
SUBSCRIPT	Appears when the *Sub* key is pressed while holding down the *Ctrl* key; you can enter a number key to get the subscript character. This message disappears after the subscript character is created. *Note:* To quit without entering a subscript character, press the *Reset* key.
SUPERSCRIPT	Appears when the *Super* key is pressed while holding down the *Ctrl* key; you can enter a number key to get the superscript character. This message disappears after the superscript character is created. *Note:* To quit without entering the superscript character, press the *Reset* key.
TEST	Appears when the *Hold* key is pressed while holding down the *Ctrl* and *Shift* keys; the 3151 enters test mode. Disappears when the *Hold* key is pressed while holding down the *Ctrl* and *Shift* keys in test mode.
TRACE	Appears when the *Trace* key is pressed or the Begin Outbound Trace command is received; the 3151 enters outbound trace mode. This message disappears when the *Trace* key is pressed while holding down the *Ctrl* key in outbound trace mode.

Figure 5-2 (Part 4 of 5). 3151 Operator Messages

Message	Description
TRANSP	Appears when the DLE STX is received and shows that the 3151 is operating in transparent mode. This message disappears when the DLE ETX is received.
UP SHIFT	Appears when the *Shift* key is pressed and held down.
WRONG PLACE	Appears when you press any invalid key in a protected field or on a field attribute character position. It also appears when you try to insert a character or line where there is no space (Forcing Insert parameter is OFF). This message disappears when you press the *Reset* key.

Figure 5-2 (Part 5 of 5). 3151 Operator Messages

Chapter 6. Commands and Responses

This chapter describes the 3151 commands and responses.

If this is your first experience with the 3151, you will probably want to read this chapter from beginning to end. The 3151 commands and responses are presented in order by function, to make it easy for you to understand how they relate to each other.

If you are already familiar with the 3151, and need information about a specific 3151 command, you may want to start with "Commands and Responses List" on page 6-8. The list will refer you to the page in this chapter in which the command is described.

Appendix B, "Summary of Commands" also summarizes the 3151 commands and responses.

Contents

Overview

Commands are sent from the host system to the 3151 to control the 3151's functions. *Responses* are sent to the host system from the 3151 in response to commands or when selected keys are pressed. Some commands can also be entered from the keyboard.

The following are examples of the 3151 commands; Set Control 1 and Set Character Attribute.

ESC SP 9 `pa1 pa2 op`

ESC 4 `pa op`

The 3151 commands and responses start with an ASCII ESC character and are also called *ESC sequences*. This chapter also describes the ASCII control characters and DLE sequences. They perform a similar function as an ESC sequence does.

Normally, the 3151 interprets the data stream from the host system as ASCII codes. The 3151 can receive and interpret three types of character strings, which may be sent from the host system. Figure 6-1 on page 6-3 shows the 3151 acceptable characters (strings).

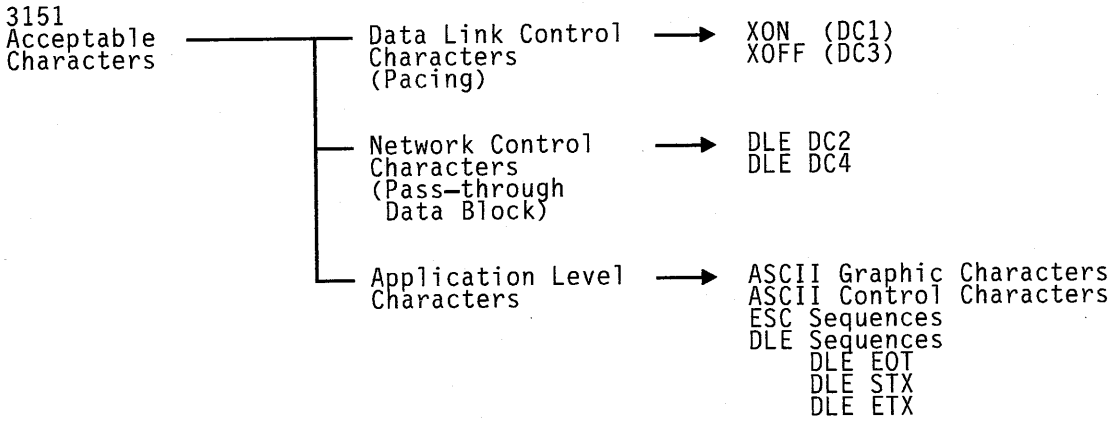


Figure 6-1. 3151 Acceptable Characters (Strings)

Characters	Description
Data link control	Performs the pacing.
Network control	Performs the pass-through operation. See "Pass-through Operations" on page 3-37 for more information.
Application level	An ASCII graphic character (X'21' through X'7E') is only displayed on the screen. An ASCII control character (X'00' through X'20' and X'7F'), ESC and DLE sequences perform the predetermined functions. See "ASCII Control Characters" on page 6-125 for the description of the ASCII control characters and "DLE Sequences" on page 6-130 for the description of the DLE sequences.

Set/Read Control 1

The connectivity cartridge manual states that the Operation Specifier byte <op> must have bits 7 & 6 set to 0, 1 respectively. (ref. format for <op> on next page)

Notation Conventions and Ru

The following notations are used guide:

ESC	Means an es
	All 3151 cor character.
SP	Means a spa
LTA	Means a lin
BS	Means a backspace character (X'08').
pa	Means a parameter.
	pa1, pr, and etc. are also used to represent a parameter. Each parameter represents an ASCII graphic character (X'21' through X'7E') or a space (X'20') after all bits of the parameter are resolved.
*	In this chapter, means the default setting.
B' '	If a number is enclosed by B' ', the number is represented in binary form.
X' '	If a number is enclosed by X' ', the number is represented in hexadecimal form.
Bit positions	Bit 7 in 7-bit mode (or bit 8 in 8-bit mode) is the most significant bit and bit 1 is the least significant bit.
Reserved	Assign B'0' for this bit. If a reserved bit is assigned to B'1', it is ignored and the current setting is used.

Figure 6-2. Notation Conventions

Notation Conventions and Rules

The following notations are used to define the command syntax throughout this guide:

ESC	Means an escape character (X'1B'). All 3151 commands and responses start with the ESC character.
SP	Means a space character (X'20').
LTA	Means a line turnaround character (ETX, CR, EOT, or DC3).
BS	Means a backspace character (X'08').
pa	Means a parameter. pa1, pr, and etc. are also used to represent a parameter. Each parameter represents an ASCII graphic character (X'21' through X'7E') or a space (X'20') after all bits of the parameter are resolved.
*	In this chapter, means the default setting.
B' '	If a number is enclosed by B' ', the number is represented in binary form.
X' '	If a number is enclosed by X' ', the number is represented in hexadecimal form.
Bit positions	Bit 7 in 7-bit mode (or bit 8 in 8-bit mode) is the most significant bit and bit 1 is the least significant bit.
Reserved	Assign B'0' for this bit. If a reserved bit is assigned to B'1', it is ignored and the current setting is used.

Figure 6-2. Notation Conventions

Format of Parameter Bits

The 3151 provides the two types of parameters; *intermediate* and *final.* In the Set Character Attribute command, `pa` is the final parameter. In the Set Control 1 command, `pa1` is the intermediate parameter and `pa2` is the final parameter.

Intermediate Parameter

In this parameter, bit 7 should be 0 and bit 6 should be 1. The intermediate parameter is always followed by another parameter.

Final Parameter

In this parameter, bit 7 should be 1 and bit 6 should be 0. The final parameter must be used for the last parameter in a parameter field.

Operation Specifier

The operation specifier is an optional byte that is applied to all Set Control, the Set Field Attribute, and the Set Character Attribute commands. Using this byte, the current parameter settings defined by these commands can be changed as one of the following:

- The current parameter settings are replaced with new ones.
- The current parameter settings are logically ORed with new ones.
- The current parameter settings are logically ANDed with new ones.

When the operation specifier is not used, the current parameter settings are replaced with new ones. The operation specifier must be placed at the last of the parameter field, thus becoming the new final parameter. If this parameter is specified, bits 7 and 6 of the previous final parameter must be B'0' and B'1', respectively.

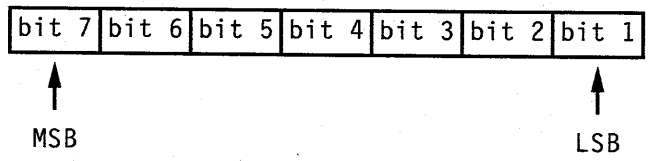
The parameter format of the operation specifier follows:

Bit	Content	Description
7	B'1'	Always 1
6	B'1'	Always 1
5-1		Operation Specifier
	B'00000'	Replacement*
	B'00001'	Logical OR
	B'00010'	Logical AND
	B'00011'	
	|	Reserved
	B'11110'	
	B'11111'	Interpreted as the DEL character

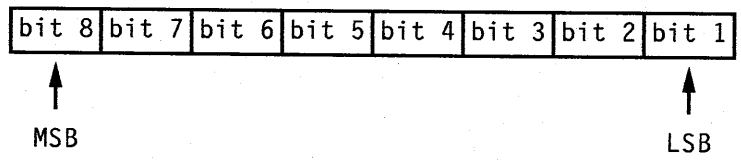
Most Significant Bit (MSB) and Least Significant Bit (LSB)

The following shows the bit configurations in 7-bit and 8-bit modes.

7–bit Mode



8–bit Mode



Syntax Error

If a syntax error occurs, the following occurs:

- If an undefined command is used, it is ignored and the command error status bits are set. The status can be read by the Read Status command.

  If the undefined command is entered from the keyboard, INVALID KEY is displayed in the operator information area.

- If less parameters are specified than required, the default setting is used, or the command is ignored and the command error status bits are set. The status can be read by the Read Status command.

  If the command (with less parameters than required) is entered from the keyboard, INVALID KEY is displayed in the operator information area.

- If more parameters are specified than required, the result may be unpredictable. The content of the screen is lost and the command error status bits are set. The status can be read by the Read Status command.

  If the command (with more parameters than required) is entered from the keyboard, INVALID KEY is displayed in the operator information area.

Commands and Responses List

Figure 6-3 lists the 3151 commands and responses. They are classified by their functions.

Note: In the **Model 11** column of the following figure, '-' means that the command is not supported for the Model 11.

Type	Commands and Responses	Model 11	Page
Control	**<Setup Parameters Control>**		
	Set/Read Control 1		6-13
	Set/Read Control 2		6-16
	Set/Read Control 3		6-19
	Set/Read Control 4		6-22
	Set/Read Control 5		6-24
	Set/Read Control 6		6-29
	Set/Read Control 7		6-33
	<Keyboard Control>		
	Enable/Disable Print Key Attention		6-36
	Enable/Disable Reset Key Attention		6-37
	Keyboard Lock/Unlock		6-38
	Reset Keyboard Lock and MDT Bit		6-39
	<Model/Read Status/Terminal ID>		
	Read Model		6-40
	Extended Read Model		6-42
	Read Status		6-46
	Read Terminal ID		6-48
	Cancel		6-49
	Reset to Initial State Command		6-50
	<Alarm Control by ASCII Characters>		
	BEL		6-127

Figure 6-3 (Part 1 of 4). Commands and Responses List

Type	Commands and Responses	Model 11	Page
Editing	**<Cursor Control>**		
	Cursor Home		6-51
	Cursor Move		6-52
	Index/Reverse Index		6-53
	Insert Cursor		6-54
	Next Line		6-55
	Read Cursor Address		6-56
	Reset Buffer Address Mode		6-57
	Set Buffer Address		6-58
	Extended Set Buffer Address	-	6-60
	Set Cursor Address		6-62
	Extended Set Cursor Address	-	6-64
	<Cursor Control by ASCII Characters>		
	BS, HT, LF, VT, FF, CR		6-127
	<Tab Control>		
	Set/Clear Column Tab		6-66
	Clear All Column Tabs		6-67
	Back Tab		6-68
	<Clear/Erase>		
	Clear All		6-69
	Clear Page		6-70
	Erase EOL/F		6-71
	Erase EOP		6-72
	Erase Input		6-73
	<Delete/Insert>		
	Delete Character		6-74
	Delete Line		6-75
	Insert Character		6-76
	Insert Line		6-78
	<Display>		
	Display Host Message	-	6-79
	Write Host Message	-	6-80
	Write Send Mark		6-82

Figure 6-3 (Part 2 of 4). Commands and Responses List

Type	Commands and Responses	Model 11	Page
Screen	**< Attribute Control >**		
	Set Field Attribute		6-83
	Set Character Attribute		6-87
	Enable/Disable Default Field Attribute		6-89
	Enable/Disable Field Attribute Visible Renditions		6-90
	Enable/Disable Host Protect		6-92
	Enable/Disable Read Unprotected Field		6-93
	Enable/Disable Write Null		6-94
	< Viewport/Partition/Page Control >		
	Create Viewport	-	6-95
	Select Active Partition	-	6-98
	Select Host Partition	-	6-99
	Jump Partition	-	6-100
	Enable/Disable Partition Separator Line	-	6-101
	Enable/Disable OIA Divider Line		6-102
	Display Machine Status	-	6-103
Read/Send	Read Line/Send Line		6-104
	Read Page/Send Page		6-105
	Read Message/Send Message		6-106
	Read All		6-107
Print	Print Line		6-108
	Print Screen		6-109
	Print Message		6-110
	Print Viewport		6-111
Function Key Control	Load Programmable Function Key		6-112
	Set All Default Function Keys		6-116
	Set Default Function Key		6-117
Character Set Control	Select Character Set G0/G1		6-120
	< Using ASCII Control Characters >		
	SI, SO		6-128

Figure 6-3 (Part 3 of 4). Commands and Responses List

Type	Commands and Responses	Model 11	Page
Communications Control	Begin/End Outbound Trace		6-121
	<Using ASCII Control Characters>		
	DLE Sequences		6-130
	DC1 (XON), DC3 (XOFF)		6-128

Figure 6-3 (Part 4 of 4). Commands and Responses List

Set/Read Control 1 Commands/Response

Function

Sets or reads the machine and operating modes of the 3151.

Format

- Set Control 1 command

  ESC SP 9 `pa1 pa2 op`

- Read Control 1 command

  ESC SP 7

- Read Control 1 response

  ESC SP 7 `pa1 pa2` LTA

Note: `pa2` must be used to select TVI-925E/925 or TVI-920/912; otherwise it must be omitted.

Parameters

`pa1`:

Bit	Content	Description
7	B'1' B'0'	When `pa2` is not used When `pa2` is used

Bit	Content	Description
6	B'0' B'1'	When pa2 is not used When pa2 is used
5-3		Machine Mode
	B'000' B'001' B'010' B'011' B'100' B'101' B'110' B'111'	IBM 3151* IBM 3101 (cannot be selected for the Model 11) ADM-3A ADM-5 ADDS VP A2 HZ-1500 TVI-910+/910 When pa2 is used
2-1		Operating Mode
	B'00' B'01' B'10' B'11'	Echo Character Block* Reserved

pa2:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5	B'0'	Reserved
4-1		Machine Mode
	B'0000' B'0001' B'0010' | B'1111'	TVI-925E/925 TVI-920/912 Reserved

op:

The operation-specifier parameter op can be added. This parameter must be placed at the last of the parameter field. If this parameter is specified, bits 7 and 6 of the parameter pa1 (or pa2) must be B'0' and B'1', respectively. See "Operation Specifier" on page 6-5 for more information.

Usage Note

This command takes approximately 500 ms to be processed. Specify a 500 ms interval before issuing the next command.

Machine modes are classified into three groups; IBM 3151, IBM 3101, and ten ASCII terminals. If the machine mode is changed to a new machine mode in a different group, setup-value definitions that are in use are replaced with the ones for the new machine modes and the power-on reset (except the checking of the internal circuits) is performed.

Set/Read Control 2 Commands/Response

Function

Sets or reads the machine status of the 3151.

Format

- Set Control 2 command

  ESC ! 9 pa1 pa2 op

- Read Control 2 command

  ESC ! 7

- Read Control 2 response

  ESC ! 7 pa1 pa2 LTA

Parameters

pa1:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1

Bit	Content	Description
5		Forcing Insert Line
	B'0'	Disabled*
	B'1'	Enabled
4		Enter Key
	B'0'	Works as the *Send* key
	B'1'	Works as the *Return* key*
3	B'0'	Reserved
2-1		CRT Saver
	B'00'	No saver*
	B'01'	15 minutes
	B'10'	15 minutes
	B'11'	15 minutes

pa2:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5		Forcing Insert Character
	B'0'	Disabled*
	B'1'	Enabled
4	B'1'	Always 1 (Set Field Attribute command cannot be entered from the keyboard)
3		Operator Initiated Transparent Mode
	B'0'	Enabled*
	B'1'	Disabled

Bit	Content	Description
2		New Line
	B'0'	Generates a CR/LF character when the *Return* key is pressed
	B'1'	Generates a CR character when the *Return* key is pressed*
1	B'0'	Reserved

op:

The operation-specifier parameter op can be added. This parameter must be placed at the last of the parameter field. If this parameter is specified, bits 7 and 6 of the parameter pa2 must be B'0' and B'1', respectively. See "Operation Specifier" on page 6-5 for more information.

Usage Note

You can omit parameter pa2 by specifying B'1' for bit 7 and B'0' for bit 6 of parameter pa1.

Set/Read Control 3 Commands/Response

Function

Sets or reads the display functions of the 3151.

Format

- Set Control 3 command

  ESC " 9 pa1 pa2 op

- Read Control 3 command

  ESC " 7

- Read Control 3 response

  ESC " 7 pa1 pa2 LTA

Parameters

pa1:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1

Bit	Content	Description
5-4		Scroll (temporary)
	B'00'	No scroll
	B'01'	Jump scroll*
	B'10'	Smooth scroll
	B'11'	Reserved
3		Line Wrap
	B'0'	Off
	B'1'	On*
2		Auto LF
	B'0'	Off
	B'1'	On*
1		ASCII LF Character
	B'0'	Line feed*
	B'1'	New line

pa2:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5-4		Scroll (permanently)
	B'00'	No scroll
	B'01'	Jump scroll*
	B'10'	Smooth scroll
	B'11'	Reserved

Bit	Content	Description
3		Insert Character
	B'0'	Sets insert mode*
	B'1'	Inserts a space character
2		Tab
	B'0'	Field tab*
	B'1'	Column tab
1		Return Key
	B'0'	Field*
	B'1'	New line

op:

The operation-specifier parameter op can be added. This parameter must be placed at the last of the parameter field. If this parameter is specified, bits 7 and 6 of the parameter pa2 must be B'0' and B'1', respectively. See "Operation Specifier" on page 6-5 for more information.

Usage Note

You can omit parameter pa2 by specifying B'1' for bit 7 and B'0' for bit 6 of parameter pa1, respectively.

Smooth scroll is equivalent to the SMOOTH F value in the setup menu.

Set/Read Control 4 Commands/Response

Function

Sets or reads the Send parameters of the 3151.

Format

- Set Control 4 command

  ESC # 9 pa op

- Read Control 4 command

  ESC # 7

- Read Control 4 response

  ESC # 7 pa LTA

Parameters

pa:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5	B'0'	Reserved

Bit	Content	Description
4		Send Line
	B'0'	*Send* key works as *Send* key and *Send Line* key works as *Send Line* key*
	B'1'	*Send* key works as *Send Line* key and *Send Line* key works as *Send* key
3		Send Null Suppress
	B'0'	Off
	B'1'	On*
2		Lock Keyboard and Keep MDT Bit
	B'0'	Off*
	B'1'	On
1		Send Data Format
	B'0'	Text LTA*
	B'1'	AID LTA

op:

The operation-specifier parameter op can be added. This parameter must be placed at the last of the parameter field. If this parameter is specified, bits 7 and 6 of the parameter pa must be B'0' and B'1', respectively. See "Operation Specifier" on page 6-5 for more information.

Usage Note

When a send or read operation is completed and the "Lock Keyboard and Keep MDT Bit" parameter is ON, the keyboard is locked and the MDT bits remain unchanged (SENDING continues to be displayed). Therefore, an application program can issue one of the read commands again to retry the read operation if errors are detected during data transmission.

Set/Read Control 5 Commands/Response

Function

Sets or reads the communication values on the main port.

Format

- Set Control 5 command

  ESC $ 9 pa1 pa2 pa3 pa4 op

- Read Control 5 command

  ESC $ 7

- Read Control 5 response

  ESC $ 7 pa1 pa2 pa3 pa4 LTA

Parameters

pa1:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1

Bit	Content	Description
5		Stop Bits
	B'0'	1*
	B'1'	2
4-1		Line Speed
	B'0000'	50 bps when bit 3 of pa3 is B'0' 38400 bps when bit 3 of pa3 is B'1'
	B'0001'	75 bps
	B'0010'	110 bps
	B'0011'	134.5 bps
	B'0100'	150 bps
	B'0101'	200 bps
	B'0110'	300 bps
	B'0111'	600 bps
	B'1000'	1200 bps
	B'1001'	1800 bps
	B'1010'	2400 bps
	B'1011'	3600 bps
	B'1100'	4800 bps
	B'1101'	Reserved
	B'1110'	9600 bps*
	B'1111'	19200 bps

pa2:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5		Interface
	B'1'	EIA RS-232C (Always 1)
4		Word Length
	B'0'	7-bit*
	B'1'	8-bit

Bit	Content	Description
3-1		Parity
	B'000'	No
	B'001'	Space
	B'010'	Mark
	B'011'	Odd*
	B'100'	Even
	B'101'	Reserved
	B'110'	Reserved
	B'111'	Reserved

pa3:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5	B'0'	Reserved
	B'1'	100 ms response delay is returned in response to the Read Control 5 command
4	B'0'	Reserved
3		Line Speed Extension
	B'0'	Not extended*
	B'1'	Extended
2-1		Line Control
	B'00'	CRTS
	B'01'	PRTS*
	B'10'	IPRTS
	B'11'	Reserved

pa4:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5	B'0'	Reserved
	B'1'	Enable outbound pacing is returned in response to the Read Control 5 command
4	B'0'	Reserved
	B'1'	Enable inbound pacing is returned in response to the Read Control 5 command
3		Break Signal
	B'0'	170 ms
	B'1'	500 ms*
2-1		Turnaround Character
	B'00'	ETX*
	B'01'	CR
	B'10'	EOT
	B'11'	DC3

op:

The operation-specifier parameter op can be added. This parameter must be placed at the last of the parameter field. If this parameter is specified, bits 7 and 6 of the parameter pa4 must be B'0' and B'1', respectively. See "Operation Specifier" on page 6-5 for more information.

Usage Note

The inbound and outbound pacing are disabled when DC3 is selected for the turnaround character.

The DTR signal on the main port turns off for approximately 350 ms when either the word length or parity is changed by the Set Control 5 command.

You can omit parameter `pa2` through `pa4` by specifying B'1' for bit 7 and B'0' for bit 6 of each previous parameter.

Set/Read Control 6 Commands/Response

Function

Sets or reads the communication values on the auxiliary port.

Format

- Set Control 6 command

  ESC % 9 pa1 pa2 pa3 pa4 op

- Read Control 6 command

  ESC % 7

- Read Control 6 response

  ESC % 7 pa1 pa2 pa3 pa4 LTA

Parameters

pa1:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5		Stop Bits
	B'0'	1*
	B'1'	2

Bit	Content	Description
4-1		Line Speed
	B'0000'	50 bps
	B'0001'	75 bps
	B'0010'	110 bps
	B'0011'	134.5 bps
	B'0100'	150 bps
	B'0101'	200 bps
	B'0110'	300 bps
	B'0111'	600 bps
	B'1000'	1200 bps
	B'1001'	1800 bps
	B'1010'	2400 bps
	B'1011'	3600 bps
	B'1100'	4800 bps
	B'1101'	Reserved
	B'1110'	9600 bps*
	B'1111'	19200 bps

pa2:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5	B'0'	Reserved
4		Word Length
	B'0'	7-bit*
	B'1'	8-bit

Bit	Content	Description
3-1		Parity
	B'000'	No
	B'001'	Space
	B'010'	Mark
	B'011'	Odd*
	B'100'	Even
	B'101'	Reserved
	B'110'	Reserved
	B'111'	Reserved

pa3:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5-3	B'0'	Reserved
2	B'0'	Reserved
	B'1'	Enable auxiliary port outbound pacing is returned in response to the Read Control 6 command
1	B'0'	Reserved
	B'1'	Enable auxiliary port inbound pacing is returned in response to the Read Control 6 command

pa4:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0

Bit	Content	Description
5-4	B'0'	Always 0
3		Inbound Pass-through
	B'0'	Disabled* (Always 0 for the Model 11)
	B'1'	Enabled
2-1	B'00'	Reserved
	B'01'	Enable outbound trace is returned in response to the Read Control 6 command

op:

The operation-specifier parameter op can be added. This parameter must be placed at the last of the parameter field. If this parameter is specified, bits 7 and 6 of the parameter pa4 must be B'0' and B'1', respectively. See "Operation Specifier" on page 6-5 for more information.

Usage Note

The DTR signal on the auxiliary port turns off for approximately 350 ms by the Set Control 6 command.

You can omit parameter pa2 through pa4 by specifying B'1' for bit 7 and B'0' for bit 6 of each previous parameter.

Set/Read Control 7 Commands/Response

Function

Sets or reads the information used for a print operation.

Format

- Set Control 7 command

  ESC & 9 `pa1 pa2 pa3` op

- Read Control 7 command

  ESC & 7

- Read Control 7 response

  ESC & 7 `pa1 pa2 pa3` LTA

Parameters

`pa1`:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5	B'0'	Reserved

Bit	Content	Description
4-3	B'00'	Print screen is returned in response to the Read Control 7 command
2-1	B'00'	No time fill character is returned in response to the Read Control 7 command

pa2:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5	B'0'	CR/LF for the line end character is returned in response to the Read Control 7 command
4	B'0' B'1'	Reserved Print data null suppression is returned in response to the Read Control 7 command
3	B'0' B'1'	Reserved Print EOL on is returned in response to the Read Control 7 command
2-1	 B'00' B'01' B'10' B'11'	Characters National* Reserved Reserved All

pa3:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5	B'0'	Reserved
4-1	B'0000'	Reserved
	B'0101'	Is the response to the Read Control 7 command that the DTR signal (+) is being monitored.

op:

The operation-specifier parameter op can be added. This parameter must be placed at the last of the parameter field. If this parameter is specified, bits 7 and 6 of the parameter pa3 must be B'0' and B'1', respectively. See "Operation Specifier" on page 6-5 for more information.

Usage Note

You can omit parameter pa2 and/or pa3 by specifying B'1' for bit 7 and B'0' for bit 6 of each previous parameter.

pa3:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5	B'0'	Reserved
4-1	 B'0000' B'0101'	Monitor Printer Status (DTR signal) No Monitor* Monitor

op:

The operation-specifier parameter op can be added. This parameter must be placed at the last of the parameter field. If this parameter is specified, bits 7 and 6 of the parameter pa3 must be B'0' and B'1', respectively. See "Operation Specifier" on page 6-5 for more information.

Usage Note

You can omit parameter pa2 and/or pa3 by specifying B'1' for bit 7 and B'0' for bit 6 of each previous parameter.

Enable/Disable Print Key Attention Commands

Function

After receiving the Enable Print Key Attention command, an associated print-key AID code followed by a turnaround character is sent to the host system when one of the print keys is pressed.

- ESC W LTA for the Print key
- ESC U LTA for the Print Line key
- ESC V LTA for the Pr Msg key
- ESC SP W LTA for the Print key with the Shift key.

After receiving the Disable Print Key Attention command, a print-key AID code is not sent to the host system but the print data is sent to the optional device when one of the print keys is pressed.

When power is turned on or in local mode, the print-key attention is disabled.

Format

- Enable Print Key Attention command

  ESC) :

- Disable Print Key Attention command

  ESC) ;

Enable/Disable Print Key Attention Commands

Function

After receiving the Enable Print Key Attention command, an associated print-key AID code followed by a turnaround character is sent to the host system when one of the print keys is pressed.

- ESC W LTA for the Print key
- ESC U LTA for the Print Line key
- ESC V LTA for the Pr Msg key
- ESC SP W LTA for the Print key with the Shift key.

After receiving the Disable Print Key Attention command, a print-key AID code is not sent to the host system but the print data is sent to the optional device when one of the print keys is pressed.

When power is turned on or in local mode, the print-key attention is disabled.

Format

- Enable Print Key Attention command

  ESC) :

- Disable Print Key Attention command

  ESC) ;

Enable/Disable Reset Key Attention Commands

Function

After receiving the Enable Reset Key Attention command, a reset-key AID code (ESC ! z) followed by a turnaround character (LTA) is sent to the host system when the *Reset* key is pressed.

After receiving the Disable Reset Key Attention command, a reset-key AID code is not sent to the host system but the reset-key function is performed when the *Reset* key is pressed.

When power is turned on, the reset-key attention is disabled.

Format

- Enable Reset Key Attention command

  ESC (:

- Disable Reset Key Attention command

  ESC (;

Keyboard Lock/Unlock Commands

Function

The Keyboard Lock command locks the keyboard (data cannot be entered from the keyboard) and displays "KEYS LOCKED" in the operator information area.

The Keyboard Unlock command resets the keyboard lock condition and removes the message.

Format

- Keyboard Lock command

  ESC :

- Keyboard Unlock command

  ESC ;

Reset Keyboard Lock and MDT Bit Command

Function

Resets the keyboard lock condition and resets the MDT bit off after a send or read operation, if the "Lock Keyboard and Keep MDT Bit" parameter is ON.

Format

ESC ! S

Read Model Command/Response

Function

Reads the model of the 3151.

Format

- Read Model command

  ESC SP 6

- Read Model response

  ESC SP 6 pa LTA

Parameters

pa:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5		Sub-model
	B'0'	Reserved
	B'1'	IBM 3151 family
4		Keyboard
	B'0'	With numeric keypad
	B'1'	Without numeric keypad

Bit	Content	Description
3		Communication Facilities (video element)
	B'0'	EIA RS-232C only
	B'1'	EIA RS-232C and RS-422A
2-1		Model
	B'00'	IBM 3151
	B'01'	Reserved
	B'10'	Reserved
	B'11'	Reserved

Usage Note

You should use the Extended Read Model command to read the additional model information of the 3151.

Extended Read Model Command/Response

Function

Reads the additional model information of the 3151.

Format

- Extended Read Model command

  ESC " 6

- Read Model response

  ESC " 6 pa1 pa2 pa3 pa4 pa5 LTA

Parameters

pa1:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5	B'0'	Reserved

Bit	Content	Description
4-1		Machine Type
	B'0000'	
	|	Reserved
	B'0100'	
	B'0101'	IBM 3151 Model 11
	B'0110'	IBM 3151 Models 31/41
	B'0111'	
	|	Reserved
	B'1111'	

pa2:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5-4		Logic Card Type
	B'00'	Stage 1
	B'01'	Stage 2
	B'10'	Reserved
	B'11'	Reserved
3	B'0'	Reserved
2-1		Keyboard Type
	B'00'	Keyboard with numeric keypad
	B'01'	Keyboard without numeric keypad
	B'10'	Reserved
	B'11'	Reserved

pa3:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5-3	B'0'	Reserved
2-1		Communication Facilities (video element)
	B'00'	EIA RS-232C only
	B'01'	EIA RS-232C and RS-422A
	B'10'	Reserved
	B'11'	Reserved

pa4:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5	B'0'	Reserved
4-1		Cartridge Type
	B'0000'	No cartridge used or a 3151 national language cartridge is used.
	B'0001'	Reserved
	B'0010'	'3151 cartridge to emulate IBM or DEC' is used
	B'0011'	'3151 cartridge to emulate WYSE WY-50/50+' is used
	B'0100'	
	|	Reserved
	B'1111'	

pa5:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5	B'0'	Reserved
4-1		Microcode version

Read Status Command/Response

Function

Reads the status of the 3151.

Format

- Read Status command

  ESC 6

- Read Status response

  ESC 6 `pa1 pa2` LTA

Parameters

`pa1`:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5		Communication Buffer Overrun
	B'0'	Did not occur
	B'1'	Occurred
4		Line Parity Error
	B'0'	Did not occur
	B'1'	Occurred

Bit	Content	Description
3	B'0'	Always 0
2-1		Command Error
	B'00'	No error
	B'01'	Command error
	B'10'	Reserved
	B'11'	Reserved

pa2:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5		Printing
	B'0'	Not being performed
	B'1'	Being performed
4	B'0'	Always 0
3		Data Terminal Ready (pin 20)
	B'0'	On
	B'1'	Off
2	B'0'	Always 0
1		Local Mode
	B'0'	On-line mode
	B'1'	Local mode

Read Terminal ID Command/Response

Function

Reads the terminal ID of the 3151.

Format

- Read Terminal ID command

  ESC ! 6

- Read Terminal ID response

  ESC ! 6 pa ESC 6 LTA

Parameters

pa:

Content	Description
ASCII graphic character (X'20' - X'7E')	Up to 20 characters

ESC 6 in this response is the delimiter for the pa.

Cancel Command

Function

Stops the data transfer to the host system or the optional device on the auxiliary port.

This command performs the same function as the *Cancel* key.

Format

ESC S

Reset to Initial State Command

Function

Performs a power-on reset (500 ms). See "Power-on Reset" on page 3-6 for the power-on reset.

Format

ESC SP S

Cursor Home Command/Response

Function

Sets the current cursor address to the home position (first unprotected character position in the page). It also changes the buffer address mode to the cursor address mode.

In character or echo mode, this response is sent to the host system when the *Home* key is pressed.

This command performs the same function as the *Home* key.

This command can also be entered from the keyboard.

Format

ESC H

Cursor Move Commands/Responses

Function

Changes the current cursor address one position up, down, right, or left, and move the cursor one position in the associated direction. It also changes the buffer address mode to the cursor address mode.

In character or echo mode, the associated response is sent to the host system when one of the *Cursor Move* keys (↑ ↓ → ←) is pressed.

These commands can also be entered from the keyboard.

Format

- Cursor Up

  ESC A

- Cursor Down

  ESC B

- Cursor Right

  ESC C

- Cursor Left

  ESC D

Index/Reverse Index Commands

Function

The Index command performs the line feed function. The row address of the cursor address (when in cursor address mode) or the buffer address (when in buffer address mode) increases by 1.

The Reverse Index command performs the line feed function in reverse direction. The row address of the cursor address (when in cursor address mode) or the buffer address (when in buffer address mode) decreases by 1.

These commands can also be entered from the keyboard.

Format

- Index command

  ESC SP M

- Reverse Index command

  ESC ! M

Insert Cursor command

Function

Sets the current cursor address to the current buffer address. It also changes the buffer address mode to the cursor address mode.

Format

ESC Z

Next Line Command

In an unformatted page, this command moves the cursor address (when in cursor address mode) or the buffer address (when in buffer address mode) to the first position of the next line. If the cursor or buffer address is located at the bottom of the page and the Scroll parameter is NO, the new cursor or buffer address moves to the first position of the top line. If the cursor or buffer address is located at the bottom of the page and the Scroll parameter is NO, a scrolling operation is performed and the cursor or buffer address is repositioned to the first position of the newly created line.

In a formatted page, this command moves the cursor or buffer address to the first position of the first unprotected position of the lower line. This operation wraps from the bottom line of the page to the top line of the page.

This command can also be entered from the keyboard.

Format

ESC M

Read Cursor Address Command

Function

Reads the current cursor address of the 3151.

The Set Cursor Address or Extended Set Cursor Address response is sent to the host system when the 3151 receives this command.

Format

ESC 5

Reset Buffer Address Mode Command

Function

Changes the mode from the buffer address mode to the cursor address mode. The last cursor address is used.

Format

ESC SP Z

Set Buffer Address Command/Response

Function

Sets the current buffer address to any position (1 through 25 for the row address and 1 through 95 for the column address) in the page and causes the 3151 to enter buffer address mode.

This response is returned when one of the read commands is received or one of the send keys is pressed in read-modified-field mode.

Format

ESC X `pr pc`

Parameters

`pr` Row address
`pc` Column address

See "Cursor and Buffer Address Conversion Table (Using One Byte)" on page 6-122 for the associated ASCII graphic characters for `pr` and `pc`.

Example

For example, suppose you want to set the current buffer address to 17 for the row address (`pr`) and 59 for the column address (`pc`). Using this table, you can convert 17 to 0 (X'30') and 59 to Z (X'5A').

The Set Buffer Address command used for this example is:

ESC X 0 Z

Usage Note

It is recommended that this command be used when the 3151 is operating in 80-column mode.

pc does not follow the rule for the final parameter.

Extended Set Buffer Address Command/Response

Note: This command is not supported for the Model 11.

Function

Sets the current buffer address to any position (1 through 25 for the row address and 1 through 132 for the column address) in the page and causes the 3151 to enter buffer address mode.

This response is returned when one of the read commands is received or one of the send keys is pressed in read-modified-field mode, and the column address is greater than 95.

Format

ESC x `prh prl pch pcl`

Parameters

`prh prl`	Row address
`pch pcl`	Column address

A pair of `prh` and `prl` defines the row address and a pair of `pch` and `pcl` defines the column address.

See "Cursor and Buffer Address Conversion Table (Using Two Bytes)" on page 6-123 for the associated ASCII graphic characters for `prh`, `prl`, `pch`, and `pcl`. (In this table, $\mathbf{P}_H$ means the first parameter of a pair of parameters and $\mathbf{P}_L$ means the second parameter of a pair of parameters.)

This table provides the correct result for a pair of intermediate parameters, but does not provide the correct result for a pair of parameters when the second parameter is the final parameter. In this case, the final parameter (`pcl`) uses different values for bits 6 and 7 than in the intermediate parameter. If bits 5

through 1 use the same values, the value of the final parameter is always greater than the intermediate parameter by X'20'. Therefore, if the second parameter is the final one, the correct value is obtained by adding X'20' to P_L.

Example

For example, suppose you want to set the current buffer address to 25 for the row address (`prh` and `prl`) and 101 for the column address (`pch` and `pcl`). Using this table, you can convert 25 to SP (X'20') for `prh` and to 8 (X'38') for `prl`. 101 can be converted to # (X'23') for `pch` and to D (X'44') for `pcl`. Notice that `pcl` is generated by adding X'20' to X'24'.

The Extended Set Buffer Address command used for this example is:

ESC x SP : # D

Usage Note

It is recommended that this command be used when the 3151 is operating in 132-column mode.

Set Cursor Address Command/Response

Function

Sets the current cursor address to any position (1 through 25 for the row address and 1 through 95 for the column address) in the page and causes the 3151 to enter cursor address mode.

This response is returned when the Read Cursor Address command is received.

Format

ESC Y `pr pc`

Parameters

`pr` Row address
`pc` Column address

See "Cursor and Buffer Address Conversion Table (Using One Byte)" on page 6-122 for the associated ASCII graphic characters for `pr` and `pc`.

Example

For example, suppose you want to set the current cursor address to 17 for the row address (`pr`) and 59 for the column address (`pc`). Using this table, you can convert 17 to 0 (X'30') and 59 to Z (X'5A').

The Set Cursor Address command used for this example is:

ESC Y 0 Z

Usage Note

It is recommended that this command be used when the 3151 is operating in 80-column mode.

`pc` does not follow the rule for the final parameter.

Extended Set Cursor Address Command/Response

Note: This command is not supported for the Model 11.

Function

Sets the current cursor address to any position (1 through 25 for the row address and 1 through 132 for the column address) in the page and causes the 3151 to enter cursor address mode.

This response is returned when the Read Cursor Address command is received.

Format

ESC y `prh prl pch pcl` pad

Parameters

this command deletes the next character in the stream. does not work if pad is a space. "h" works nicely. Why ??

`prh prl`	Row address
`pch pcl`	Column address

A pair of `prh` and `prl` defines the row address and a pair of `pch` and `pcl` defines the column address.

See "Cursor and Buffer Address Conversion Table (Using Two Bytes)" on page 6-123 for the associated ASCII graphic characters for `prh`, `prl`, `pch`, and `pc`. (In this table, $\mathbf{P}_H$ means the first parameter of a pair of parameters and $\mathbf{P}_L$ means the second parameter of a pair of parameters.)

This table provides the correct result for a pair of intermediate parameters, but does not provide the correct result for a pair of parameters when the second parameter is the final parameter. In this case the final parameter (`pcl`) uses different values for bits 6 and 7 than the intermediate parameter. If bits 5 through 1 use the same values, the value of the final parameter is always greater

than the intermediate parameter by X'20'. Therefore, if the second parameter is the final one, the correct value is obtained by adding X'20' to P_L.

Example

For example, suppose you want to set the current cursor address to 25 for the row address (prh and prl) and 101 for the column address (pch and pcl). Using this table, you can convert 25 to SP (X'20') for prh and to 8 (X'38') for prl. 101 can be converted to # (X'23') for pch and to D (X'44') for pcl. Notice that pcl is generated by adding X'20' to X'24'.

The Extended Set Cursor Address command used for this example is:

ESC y SP : # D

Usage Note

It is recommended that this command be used when the 3151 is operating in 132-column mode.

Set/Clear Column Tab Commands

Function

The Set Column Tab command sets column-tab stops at the current column of the current cursor address (when in cursor address mode) or buffer address (when in buffer address mode).

The Clear Column Tab command clears column-tab stops at the current column of the current cursor address (when in cursor address mode) or buffer address (when in buffer address mode).

These commands can also be entered from the keyboard.

Format

- Set Column Tab command

  ESC 0

- Clear Column Tab command

  ESC 1

Clear All Column Tabs Command

Function

Clears all column-tab stops in the active page.

This command can also be entered from the keyboard.

Format

ESC SP 1

Back Tab Command/Response

Function

Performs the same function as the ← *Tab* key. See "Tab" on page 7-21 for more information.

In character or echo mode, this response is sent to the host system when the *Back Tab* key is pressed.

This command can also be entered from the keyboard.

Format

ESC 2

Clear All Command

Function

Changes the content of all partitions, including all attributes, to null characters.

The cursor address (when in cursor address mode) or the buffer address (when in buffer address mode) is set to the first character position of each page. Column-tab stops are also cleared.

This command can also be entered from the keyboard.

Format

ESC ! L

Clear Page Command/Response

Function

Changes the content of the current page (host partition), including all attributes, to null characters.

The cursor address (when in cursor address mode) or the buffer address (when in buffer address mode) is set to the first character position of the current page. Column-tab stops are also cleared.

This response is sent to the host system when the *Clear* key is pressed.

This command performs the same function as the *Clear* key.

This command can also be entered from the keyboard.

Format

ESC L

Erase EOL/F Command/Response

Function

In an unformatted page, this command converts all characters, from the cursor address (when in cursor address mode) or the buffer address (when in buffer address mode) to the end of the current line, to null characters; the cursor address or the buffer address is not changed and the tab stops are not cleared.

When the cursor is located in an unprotected field of a formatted page, this command converts all characters, from the cursor address or the buffer address to the end of the current line or to the end of the field (whichever comes first), to null characters; the MDT bit is set on and the cursor address or the buffer address is not changed.

In character or echo mode, this response is sent to the host system when the *Erase EOF* key is pressed.

This command performs a similar function as the *Erase EOF* key. See "Erase Operations" on page 3-17 for more information.

This command can also be entered from the keyboard.

Format

ESC I[1]

---

1 Upper case for i.

Erase EOP Command/Response

Function

In an unformatted page, this command converts all characters, from the cursor address (when in cursor address mode) or the buffer address (when in buffer address mode) to the end of the current page (host partition), to null characters; the cursor address or the buffer address is not changed and the tab stops are not cleared.

In a formatted page, this command converts all characters in the unprotected fields, from the cursor address or buffer address to the end of the current page, to null characters; the MDT bits are not affected and the cursor address or the buffer address is not changed.

In character or echo mode, this response is sent to the host system when the *Er EOP* key is pressed.

This command performs a similar function as the *Er EOP* key. See "Erase Operations" on page 3-17 for more information.

This command can also be entered from the keyboard.

Format

ESC J

Erase Input Command/Response

Function

In an unformatted page, this command converts all characters in the current page (host partition) to null characters; the cursor address (when in cursor address mode) or the buffer address (when in buffer address mode) changes to the home-position address; the tab stops are not cleared.

In a formatted page, this command converts all characters in the unprotected fields of the current page to null characters; the MDT bits of all unprotected fields are reset off and the cursor address or buffer address changes to the first unprotected character position. If there are no unprotected fields, only the cursor address or the buffer address changes to the first position of the page.

In character or echo mode, this response is sent to the host system when the *Er Inp* key is pressed.

This command performs a similar function as the *Er Inp* key. See "Erase Operations" on page 3-17 for more information.

This command can also be entered from the keyboard.

Format

ESC K

Delete Character Command/Response

Function

Deletes the character at the current cursor address (when in cursor address mode) or buffer address (when in buffer address mode).

In character or echo mode, this response is sent to the host system when the *Delete* key is pressed.

This command performs a similar function as the *Delete* key. See "Delete Operations" on page 3-15 for more information.

This command can also be entered from the keyboard.

Format

ESC Q

Delete Line Command/Response

Function

Deletes the current line.

In character or echo mode, this response is sent to the host system when the *Del Ln* key is pressed.

This command performs a similar function as the *Del Ln* key. See "Delete Operations" on page 3-15 for more information.

This command sets the column address of the cursor (when in cursor address mode) or buffer (when in buffer address mode) address to 1.

This command can also be entered from the keyboard.

Format

ESC O

Insert Character Command/Response

Function

Inserts any specified alphanumeric character at the current buffer address (when in buffer address mode) or cursor address (when in cursor address mode).

In character or echo mode, the response (ESC P pa) is sent to the host system when any alphanumeric character is entered after the *Insert* key is pressed (when the Insert Character parameter is MODE), or the response (ESC P SP BS) is sent to the host system when the *Insert* key is pressed (when the Insert Character parameter is SPACE).

This command performs a similar function as the *Insert* key. See "Insert Operations" on page 3-10 for more information.

This command can also be entered from the keyboard.

Format

- Insert Character command

  ESC P pa

- Insert Character response (when the Insert Character parameter is MODE)

  ESC P pa

- Insert Character response (when the Insert Character parameter is SPACE)

  ESC P SP BS

Parameters

pa	Any alphanumeric character

Insert Line Command/Response

Function

Inserts a null line at the current line.

In character or echo mode, this response is sent to the host system when the *Ins Ln* key is pressed.

This command performs a similar function as the *Ins Ln* key. See "Insert Operations" on page 3-10 for more information.

This command can also be entered from the keyboard.

Format

ESC N

Display Host Message Command

Function

Displays the host message that is already stored in the character buffer of the OIA.

This command performs a similar function as the *Msg* key.

Format

ESC # ;

Usage Note

When this command is received, the OIA displays the host message until the Display Machine Status command is received or the *Msg* key is use to change the OIA nature.

Display Host Message Command

Function

Displays the host message that is already stored in the character buffer of the OIA.

This command performs a similar function as the *Msg* key.

Format

ESC # ;

Usage Note

When this command is received, the OIA displays the host message until the Display Machine Status command is received or the *Msg* key is use to change the OIA nature.

Write Host Message Command

Function

Writes a host message into the character buffer of the OIA.

If the message is longer than 80 or 132 characters (80- or 132-column mode, respectively), the overflow character is written over the last characters in the OIA, discarding the last character, until no overflow characters remain.

Format

ESC = `message` ESC =

Parameters

`message`:

Content	Description
Host message	The host message can include: • ASCII graphic characters (X'20' through X'7E') • ASCII graphic characters (X'A0' through X'FE') in 8-bit mode • SI and SO control characters in 7-bit mode • Select Character Set G0/G1 commands • Set Character Attribute command

Write Host Message Command

Function

Write a host message in the OIA.

If the message is longer than 80 or 132 characters (80- or 132-column mode, respectively), the overflow character is written over the last characters in the OIA, discarding the last character, until no overflow characters remain.

Format

ESC = `message` ESC =

Parameters

`message`:

Content	Description
Host message	The host message can include: • ASCII graphic characters (X'20' through X'7E') • ASCII graphic characters (X'A0' through X'FE') in 8-bit mode • SI and SO control characters in 7-bit mode • Select Character Set G0/G1 commands • Set Character Attribute command

Usage Note

When the host message is displayed in the OIA, the following conditions are assumed:

- The U.S. ASCII character set is assigned to the G0 space and the special graphic character set is assigned to the G1 space
- The U.S. ASCII character set is selected
- The character attributes are set as follows:
  - Normal Video
  - Normal intensity
  - Non-underline
  - Non-blinking.

This command does not display the message in the OIA. It can only write the message in the character buffer of the OIA. The message can be displayed, however, when an operator selects host-message-display mode by using the *Msg* key or when the Display Host Message command is received.

Usage Note

When the host message is displayed in the OIA, the following conditions are assumed:

- The U.S. ASCII character set is assigned to the G0 space and the special graphic character set is assigned to the G1 space
- The U.S. ASCII character set is selected
- The character attributes are set as follows:
  - Normal Video
  - Normal intensity
  - Non-underline
  - Non-blinking.

Write Send Mark Command

Function

Writes a send mark (⌂) at the current cursor address (when in cursor address mode) or the buffer address (when in buffer address mode). The previously stored send mark, if it exists, is replaced with a null character.

This command can also be entered from the keyboard.

Format

ESC E

Write Send Mark Command

Function

Writes a send mark (␢) at the current cursor address (when in cursor address mode) or the buffer address (when in buffer address mode). The previously stored send mark, if it exists, is replaced with a null character.

This command can also be entered from the keyboard.

Format

ESC E

Set Field Attribute Command/Response

Function

Writes a field attribute at the current cursor address (when in cursor address mode) or the current buffer address (when in buffer address mode).

Note: A field attributes occupies one character position and increases the current cursor or buffer address by 1.

This response is returned when:

- The Read All command is received.
- One of the read commands or one of the send keys is pressed in read-unprotected-field mode.

Format

- Set Field Attribute command

  ESC 3 `pa1 pa2 op`

- Set Field Attribute response

  ESC 3 `pa1 pa2`

Parameters

pa1:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5		Normal or Non-display
	B'0'	Normal display*
	B'1'	Non-display
4		Intensity
	B'0'	Normal intensity*
	B'1'	High intensity
3		Blink
	B'0'	Off*
	B'1'	On
2		Underline
	B'0'	Off*
	B'1'	On
1		Normal or Reverse Video
	B'0'	Normal video*
	B'1'	Reverse video

pa2:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5	B'0'	Reserved

Bit	Content	Description
4		Numeric
	B'0'	No*
	B'1'	Yes
3	B'0'	Reserved
2		Protected or Unprotected
	B'0'	Unprotected*
	B'1'	Protected
1		Modified Data Tag
	B'0'	Not modified*
	B'1'	Modified

op:

The operation-specifier parameter op can be added. This parameter must be placed at the last of the parameter field. If this parameter is specified, bits 7 and 6 of the parameter pa2 must be B'0' and B'1', respectively. See "Operation Specifier" on page 6-5 for more information.

Usage Note

You can omit parameter pa2 by specifying B'1' for bit 7 and B'0' for bit 6 of parameter pa1.

Coding Examples

- Normal display field

  ESC 3 SP @ or ESC 3 @

- High intensity field

  ESC 3 (@ or ESC 3 H

- Blink and protected field

  ESC 3 $ B

- Underline and MDT bit on

  ESC 3 " A

- Reverse and protected field

  ESC 3 ! B

- Non-display field

  ESC 3 0 @ or ESC 3 P

- Numeric field

  ESC 3 SP H

Set Character Attribute Command

Writes a character attribute at the current cursor address (when in cursor address mode) or the current buffer address (when in buffer address mode). The character attribute is effective until the new character attribute or a field attribute is received in the data stream.

Note: A character attribute does not occupy a character position; the current cursor or buffer address is not changed after receiving this command.

This command can also be entered from the keyboard.

Format

ESC 4 pa op

Parameters

pa:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5		Normal or Non-display
	B'0'	Normal display*
	B'1'	Non-display
4		Intensity
	B'0'	Normal intensity*
	B'1'	High intensity

Bit	Content	Description
3		Blink
	B'0'	Off*
	B'1'	On
2		Underline
	B'0'	Off*
	B'1'	On
1		Normal or Reverse Video
	B'0'	Normal video*
	B'1'	Reverse video

op:

The operation-specifier parameter op can be added. This parameter must be placed at the last of the parameter field. If this parameter is specified, bits 7 and 6 of the parameter pa must be B'0' and B'1', respectively. See "Operation Specifier" on page 6-5 for more information.

Enable/Disable Default Field Attribute Commands

Function

After receiving the Enable Default Field Attribute command, the area from the beginning of the page to the first field is handled as a default-field-attribute field. A default-field-attribute setting is; normal display, normal intensity, non-blink, non-underline, normal video, non-numeric, and unprotected.

After receiving the Disable Default Field Attribute command, the area from the beginning of the page to the first field is not handled as a default-field-attribute field, but handled as a successive field from the bottom field in the same page.

When power is turned on, the default field attribute is not used.

Format

- Enable Default Field Attribute command

  ESC ′ :

- Disable Default Field Attribute command

  ESC ′ ;

Enable/Disable Field Attribute Visible Renditions Commands

Function

After receiving the Enable Field Attribute Visible Renditions command, some field attributes (high intensity, blink, underline, and reverse video), which have been hidden by the Disable Filed Attribute Visible Renditions command, become effective on the screen.

After receiving the Disable Field Attribute Visible Renditions command, some field attributes (high intensity, blink, underline, and reverse video) have no effect on the screen. The information is stored in the 3151, but the screen does not reflect their attributes.

When power is turned on, all field attributes can have an effect on the screen.

Format

- Enable Field Attribute Visible Renditions command

  ESC , :

- Disable Field Attribute Visible Renditions command

  ESC , ;

Enable/Disablle Field Attribute Visible Renditions

Usage Note

Before receiving the Disable Field Attribute Visible Renditions command, the screen may flash when the field attribute characters are received. The Disable Field Attribute Visible Renditions command removes the flashing screen by making some field attributes ineffective. It is recommended to use the Disable Field Attribute Visible Renditions command before writing the screen and then to use the Enable Filed Attribute Visible Renditions command after writing the screen.

Enable/Disable Host Protect Commands

After receiving the Enable Host Protect command and the page is formatted, the data sent from the host system cannot be written into the protected fields.

After receiving the Disable Host Protect command and the page is formatted, the data sent from the host system can be written into any position in the page.

When power is turned on, the host protect function is disabled.

Format

- Enable Host Protect command

  ESC & :

- Disable Host Protect command

  ESC & ;

Enable/Disable Read Unprotected Field Commands

After receiving the Enable Read Unprotected Field command and the page is formatted, the 3151 sends the unprotected field data (in the page, in the current line, or in the area specified by the send mark) to the host system (regardless of the MDT bit settings), in response to the following commands, or when one of the following keys is pressed.

After receiving the Disable Read Unprotected Field command and the page is formatted, the 3151 sends only the modified field data (in the page, in the current line, or in the area specified by the send mark) to the host system, in response to the following commands, or when one of the following keys is pressed.

Commands	Keys
• Read Page	• Send
• Read Line	• Send Line
• Read Message	• Send Msg

When power is turned on, the read-modified-field mode is selected.

Format

- Enable Read Unprotected Field command

  ESC % :

- Disable Read Unprotected Field command

  ESC % ;

Enable/Disable Write Null Commands

Function

After receiving the Enable Write Null command, a null character sent from the host system is handled as an ASCII graphic character. This means that a null character can be written in the page and displayed as a space character on the screen.

After receiving the Disable Write Null command, a null character sent from the host system is ignored, except in transparent mode.

When power is turned on, the write-null function is disabled.

Format

- Enable Write Null command

  ESC ″ :

- Disable Write Null command

  ESC ″ ;

Create Viewport command

Note: The Model 11 can create only one viewport with 24 or 25 lines of 80 characters each. The first two commands below can be used for the Model 11.

Function

Selects a viewport type and defines the size of the viewport.

Format

- To create one viewport (for viewport type 1), use
  - ESC SP r ! ! SP 8 " P

    for 24 lines of 80 characters each
  - ESC SP r ! ! SP 9 " P

    for 25 lines of 80 characters each
  - ESC SP r ! ! SP 8 $ D

    for 24 lines of 132 characters each
  - ESC SP r ! ! SP 9 $ D

    for 25 lines of 132 characters each

Could not Get these to Work at 0

- To create two viewports (for viewport type 2), use
  - ESC SP r " ! SP pd1 " 0 " SP pd2 " P

    for selecting a 80-column screen.

- ESC SP r " ! SP pd1 $ $ " SP pd2 $ D

  for selecting a 132-column screen.

use this instead

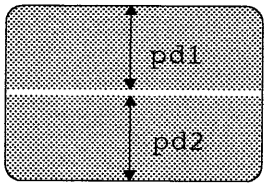
- To create three viewports (for viewport type 3), use
  - ESC SP r # ! SP pd1 " 0 " SP pd2 " 0 # SP pd3 " P

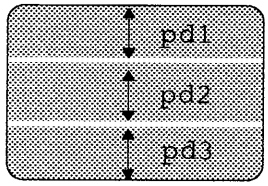
    for selecting a 80-column screen.
  - ESC SP r # ! SP pd1 $ $ " SP pd2 $ $ # SP pd3 $ D

    for selecting a 132-column screen.

Parameters

Parameters pd1, pd2, and pd3 define the number of lines for each viewport.





When creating two viewports, pd1 + pd2 must be 24 or 25. When creating three viewports, pd1 + pd2 + pd3 must be 24 or 25. The following shows the associated ASCII graphic characters for pd1, pd2, or pd3.

Number of Lines	ASCII Graphic Characters	Number of Lines	ASCII Graphic Characters	Number of Lines	ASCII Graphic Characters	Number of Lines	ASCII Graphic Characters
1	!	8	(	15	/	22	6
2	"	9	)	16	0	23	7
3	#	10	*	17	1	24	8
4	$	11	+	18	2	25	9
5	%	12	,	19	3		
6	&	13	-	20	4		
7	'	14	.	21	5		

Select Active Partition Command/Response

Note: This command is not supported for the Model 11.

Function

Selects the current active partition, which an operator can access, and moves the cursor to the current cursor address in the newly activated partition.

In block mode, this response is placed in front of the **send response** and sent to the host system when the 3151 sends data (by the *Send* key being pressed) to the host system the first time after the active partition has been changed (by the *Jump* key or by this command).

When viewport type 1 is selected, the response is not sent to the host system.

Format

```
ESC ! q pid
```

Parameters

`pid`:

Content	Description
A	Viewport 1
B	Viewport 2
C	Viewport 3

Select Host Partition Command/Response

Note: This command is not supported for the Model 11.

Function

Selects the current host partition, which the host system writes data to or reads data from.

This response is placed in front of the **read response** and sent to the host system when the 3151 sends data (by receiving the read command) to the host system the first time after the host partition has been changed (by this command).

When viewport type 1 is selected, the response is not sent to the host system.

Format

ESC SP q pid

Parameters

pid:

Content	Description
A	Viewport 1
B	Viewport 2
C	Viewport 3

Jump Partition Command/Response

Note: This command is not supported for the Model 11.

Function

Selects the next partition as a current active partition and moves the cursor to the current cursor address in the newly activated partition (the same function as the *Jump* key).

In character or echo mode, this response is sent to the host system when the *Jump* key is pressed.

When viewport type 1 is selected, this response is not sent to the host system.

This command performs the same function as the *Jump* key.

This command can also be entered from the keyboard.

Format

ESC " A

Enable/Disable Partition Separator Line

Note: This command is not supported for the Model 11.

Function

After receiving the Enable Partition Separator Line command, a separator line is displayed on the boundary between partitions.

When the screen contains only one partition, this command has no effect at this point; separator lines, however, will be displayed after receiving the Create Viewport command to create two or three viewports.

After receiving the Disable Partition Separator Line command, a separator line (if exists) disappears.

When the screen contains only one partition or no separator lines, this command has no effect.

When power is turned on, separator lines are not displayed.

Format

- Enable Partition Separator Line command

  ESC + :

- Disable Partition Separator Line command

  ESC + ;

Enable/Disable OIA Divider Line

Function

After receiving the Enable OIA Divider Line command, a separator line is displayed on the boundary between the bottom line of the display space (24 or 25th line) and the OIA, when the OIA indication is turned on.

After receiving the Disable OIA Divider Line command, a separator line cannot be displayed (disappears if it exists).

When power is turned on, a separator line is displayed when the OIA indication is turned on.

Format

- Enable OIA Divider Line command

  ESC * :

- Disable OIA Divider Line command

  ESC * ;

Display Machine Status Command

Function

Displays the 3151 status (for example, operating mode) in the OIA.

This command performs a similar function as the *Msg* key.

Format

ESC # :

Usage Note

When this command is received, the OIA displays the 3151 status until the Display Host Message command is received or the *Msg* key is used to change the OIA nature.

Read Line Command/Send Line Response

Function

Reads the content of the current line. In a formatted page, reads only the modified data (when in read-modified-field mode) or only the unprotected data (when in read-unprotected-field mode), of the current line. The cursor address (when in cursor address mode) or buffer address (when in buffer address mode) is changed according to the settings of the Return Key and Auto LF parameters (the same description for the Return Key parameter on page 7-33 applies also to this case), if the "Lock Keyboard and Keep MDT Bit" parameter is OFF. If this parameter is ON, the cursor address or buffer address is not changed until the "Reset Keyboard Lock and MDT Bit" command is received or the *Cancel* key is pressed.

In character or echo mode, this response is sent to the host system when the *Send Line* key is pressed, if the Send parameter is Page. In block mode, this response is sent to the host system when the *Send Line* key is pressed, if the Send parameter is Page and the Send Data Format parameter is AID LTA.

This command performs a similar function as the *Send Line* key. See "Send/Read Operations" on page 3-21 for more information.

Format

ESC ! 8

Read Page Command/Send Page Response

Function

Reads the content of the host partition. In a formatted page, reads only the modified data (when in read-modified-field mode) or only the unprotected data (when in read-unprotected-field mode), of the host partition. The cursor address (when in cursor address mode) or buffer address (when in buffer address mode) is changed to the home position, if the "Lock Keyboard and Keep MDT Bit" parameter is OFF. If this parameter is ON, the cursor address or buffer address is not changed until the "Reset Keyboard Lock and MDT Bit" command is received or the *Cancel* key is pressed.

In character or echo mode, this response is sent to the host system when the *Send* key is pressed, if the Send parameter is Page. In block mode, this response is sent to the host system when the *Send* key is pressed, if the Send parameter is Page and the Send Data Format parameter is AID LTA.

This command performs a similar function as the *Send* key See "Send/Read Operations" on page 3-21 for more information.

Format

ESC 8

Read Message Command/Send Message Response

Function

Reads the content of the area specified by the send mark ( ). The cursor address (when in cursor address mode) or buffer address (when in buffer address mode) is changed to the first character position of the next line, if the "Lock Keyboard and Keep MDT Bit" parameter is OFF. If this parameter is ON, the cursor address or buffer address is not changed until the "Reset Keyboard Lock and MDT Bit" command is received or the *Cancel* key is pressed.

In character or echo mode, this response is sent to the host system when the *Sn Msg* key is pressed. In block mode, this response is sent to the host system when the *Sn Msg* key is pressed, if the Send Data Format parameter is AID LTA.

This command performs a similar function as the *Sn Msg* key. See "Send/Read Operations" on page 3-21 for more information.

Format

ESC SP 8

Read All Command

Function

Reads all data in the host partition regardless of the MDT bit settings. See "Send/Read Operations" on page 3-21 for more information. The cursor address and buffer address are not changed.

Format

ESC # 8

Print Line Command/Response

Function

Sends the content of the current line to the optional device on the auxiliary port. The buffer address and the cursor address are not changed.

This response is sent to the host system when the *Print Line* key is pressed, if the print-key attention is enabled.

This command performs a similar function as the *Print Line* key. See "Print Operations" on page 3-32 for more information.

Format

ESC U

Print Screen Command/Response

Function

Sends the content of the screen to the optional device on the auxiliary port. The buffer address and the cursor address are not changed.

This response is sent to the host system when the *Print* key is pressed while holding down the *Shift* key, if the print-key attention is enabled.

This command performs a similar function as the *Print* key with the *Shift* key. See "Print Operations" on page 3-32 for more information.

Format

ESC SP W

Print Message Command/Response

Function

Sends the content of the area specified by the send mark (⌂) to the optional device on the auxiliary port. The buffer address, the cursor address, and the send mark position are not changed.

This response is sent to the host system when the *Pr Msg* key is pressed, if the print-key attention is enabled.

This command performs a similar function as the *Pr Msg* key. See "Print Operations" on page 3-32 for more information.

Format

ESC V

Print Viewport Command/Response

Function

Sends the content of the host partition to the optional device on the auxiliary port. The buffer address and the cursor address are not changed.

This response is sent to the host system when the *Print* key is pressed, if the print-key attention is enabled.

This command performs a similar function as the *Print* key. See "Print Operations" on page 3-32 for more information.

Format

ESC W

Load Programmable Function Key Command

Function

Redefines a function key. Definitions can be stored for later use.

Format

ESC ! = `fn fnx ff fp` ESC =

Note: F13 through F36 and `fnx` *are not supported for the Model 11.* `fnx` *must be used for F32 through F36; otherwise it must be omitted.*

Parameters

`fn`:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1

Bit	Content	Description
5-1		Function Key Number
	B'00000'	To select F32 through F36 using `fnx`
	B'00001'	F1
	B'00010'	F2
	B'00011'	F3
	B'00100'	F4
	B'00101'	F5
	B'00110'	F6
	B'00111'	F7
	B'01000'	F8
	B'01001'	F9
	B'01010'	F10
	B'01011'	F11
	B'01100'	F12
	B'01101'	F13
	B'01110'	F14
	B'01111'	F15
	B'10000'	F16
	B'10001'	F17
	B'10010'	F18
	B'10011'	F19
	B'10100'	F20
	B'10101'	F21
	B'10110'	F22
	B'10111'	F23
	B'11000'	F24
	B'11001'	F25
	B'11010'	F26
	B'11011'	F27
	B'11100'	F28
	B'11101'	F29
	B'11110'	F30
	B'11111'	F31

fnx:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5-1		Function Key Number
	B'00000'	Reserved
	B'00001'	F32
	B'00010'	F33
	B'00011'	F34
	B'00100'	F35
	B'00101'	F36
	B'00110'	
	|	Reserved
	B'11111'	

ff:

Bit	Content	Description
7	B'0'	Always 0
6	B'1'	Always 1
5-2	B'0'	Always 0
1		Type of Format
	B'0'	AID*
	B'1'	Character string

fp:

Content	Description
Up to 64 (Model 31/41) or 32 (Model 11) characters	Character string to be assigned for a function key

Example

- **HELLO** is sent to the host system when the *F1* key is pressed (AID format).

  ESC ! = ! SP HELLO ESC =

- **HELLO** is displayed at the cursor position when the *F1* key is pressed (character string format).

  ESC ! = ! ! HELLO ESC =

Set All Default Function Keys Command

Function

Returns all function key definitions to the default value (AID format).

See Appendix C, "AID Codes Generated by Keys" for the AID formats.

Format

ESC SP t

Set Default Function Key Command

Function

Returns a function key definition to the default value (AID format).

See Appendix C, "AID Codes Generated by Keys" for the AID formats.

Format

ESC t `fn fnx`

Note: F13 through F36 and `fnx` *are not supported for the Model 11.* `fnx` *must be used for F32 through F36; otherwise it must be omitted.*

Parameters

`fn`:

Bit	Content	Description
7	B'0' B'1'	`fnx` is used `fnx` is not used
6	B'1' B'0'	`fnx` is used `fnx` is not used

Bit	Content	Description
5-1		Function Key Number
	B'00000'	To select F32 through F36 using `fnx`
	B'00001'	F1
	B'00010'	F2
	B'00011'	F3
	B'00100'	F4
	B'00101'	F5
	B'00110'	F6
	B'00111'	F7
	B'01000'	F8
	B'01001'	F9
	B'01010'	F10
	B'01011'	F11
	B'01100'	F12
	B'01101'	F13
	B'01110'	F14
	B'01111'	F15
	B'10000'	F16
	B'10001'	F17
	B'10010'	F18
	B'10011'	F19
	B'10100'	F20
	B'10101'	F21
	B'10110'	F22
	B'10111'	F23
	B'11000'	F24
	B'11001'	F25
	B'11010'	F26
	B'11011'	F27
	B'11100'	F28
	B'11101'	F29
	B'11110'	F30
	B'11111'	F31

fnx:

Bit	Content	Description
7	B'1'	Always 1
6	B'0'	Always 0
5-1		Function Key Number
	B'00000'	Reserved
	B'00001'	F32
	B'00010'	F33
	B'00011'	F34
	B'00100'	F35
	B'00101'	F36
	B'00110'	
	|	Reserved
	B'11111'	

Select Character Set G0/G1 Commands/Responses

Function

Assigns the character set specified by `pa` to the G0 or G1 space.

The Select Character Set G1 command can also be entered from the keyboard.

Format

- Select Character Set G0

  ESC < `pa`

- Select Character Set G1

  ESC > `pa`

Parameters

`pa`:

Content	Description
@	U.S. ASCII character set
A	Special graphic character set

Begin/End Outbound Trace Commands

Function

The Begin Outbound Trace command causes the 3151 to enter trace mode. In trace mode, data from the host system is transferred to the optional device on the auxiliary port without data conversion while displaying the same data on the screen.

The End Outbound Trace command causes the 3151 to exit trace mode.

This command performs the same function as the *Trace* key.

Format

- Begin Outbound Trace command

  ESC SP :

- End Outbound Trace command

  ESC SP ;

Cursor/Buffer Address Conversion Table (One Byte)

Decimal Number	pr or pc	
	Hex. Code	ASCII Graphic
1	20	SP
2	21	!
3	22	"
4	23	#
5	24	$
6	25	%
7	26	&
8	27	'
9	28	(
10	29	)
11	2A	*
12	2B	+
13	2C	,
14	2D	-
15	2E	.
16	2F	/
17	30	0
18	31	1
19	32	2
20	33	3
21	34	4
22	35	5
23	36	6
24	37	7
25	38	8
26	39	9
27	3A	:
28	3B	;
29	3C	<
30	3D	=
31	3E	>
32	3F	?
33	40	@
34	41	A
35	42	B

Decimal Number	pr or pc	
	Hex. Code	ASCII Graphic
36	43	C
37	44	D
38	45	E
39	46	F
40	47	G
41	48	H
42	49	I
43	4A	J
44	4B	K
45	4C	L
46	4D	M
47	4E	N
48	4F	O
49	50	P
50	51	Q
51	52	R
52	53	S
53	54	T
54	55	U
55	56	V
56	57	W
57	58	X
58	59	Y
59	5A	Z
60	5B	[
61	5C	\
62	5D	]
63	5E	^
64	5F	_
65	60	`
66	61	a
67	62	b
68	63	c
69	64	d
70	65	e

Decimal Number	pr or pc	
	Hex. Code	ASCII Graphic
71	66	f
72	67	g
73	68	h
74	69	i
75	6A	j
76	6B	k
77	6C	l
78	6D	m
79	6E	n
80	6F	o
81	70	p
82	71	q
83	72	r
84	73	s
85	74	t
86	75	u
87	76	v
88	77	w
89	78	x
90	79	y
91	7A	z
92	7B	{
93	7C	|
94	7D	}
95	7E	~

Cursor/Buffer Address Conversion Table (Two Bytes)

Decimal Number	P_H		P_L	
	Hex. Code	ASCII Graphic	Hex. Code	ASCII Graphic
1	20	SP	20	SP
2	20	SP	21	!
3	20	SP	22	"
4	20	SP	23	#
5	20	SP	24	$
6	20	SP	25	%
7	20	SP	26	&
8	20	SP	27	'
9	20	SP	28	(
10	20	SP	29	)
11	20	SP	2A	*
12	20	SP	2B	+
13	20	SP	2C	,
14	20	SP	2D	-
15	20	SP	2E	.
16	20	SP	2F	/
17	20	SP	30	0
18	20	SP	31	1
19	20	SP	32	2
20	20	SP	33	3
21	20	SP	34	4
22	20	SP	35	5
23	20	SP	36	6
24	20	SP	37	7
25	20	SP	38	8
26	20	SP	39	9
27	20	SP	3A	:
28	20	SP	3B	;
29	20	SP	3C	<
30	20	SP	3D	=
31	20	SP	3E	>
32	20	SP	3F	?
33	21	!	20	SP
34	21	!	21	!
35	21	!	22	"

Decimal Number	P_H		P_L	
	Hex. Code	ASCII Graphic	Hex. Code	ASCII Graphic
36	21	!	23	#
37	21	!	24	$
38	21	!	25	%
39	21	!	26	&
40	21	!	27	'
41	21	!	28	(
42	21	!	29	)
43	21	!	2A	*
44	21	!	2B	+
45	21	!	2C	,
46	21	!	2D	-
47	21	!	2E	.
48	21	!	2F	/
49	21	!	30	0
50	21	!	31	1
51	21	!	32	2
52	21	!	33	3
53	21	!	34	4
54	21	!	35	5
55	21	!	36	6
56	21	!	37	7
57	21	!	38	8
58	21	!	39	9
59	21	!	3A	:
60	21	!	3B	;
61	21	!	3C	<
62	21	!	3D	=
63	21	!	3E	>
64	21	!	3F	?
65	22	"	20	SP
66	22	"	21	!
67	22	"	22	"
68	22	"	23	#
69	22	"	24	$
70	22	"	25	%

Cursor/Buffer Address Conversion Table (Two Bytes)

Decimal Number	P_H		P_L	
	Hex. Code	ASCII Graphic	Hex. Code	ASCII Graphic
71	22	"	26	&
72	22	"	27	'
73	22	"	28	(
74	22	"	29	)
75	22	"	2A	*
76	22	"	2B	+
77	22	"	2C	,
78	22	"	2D	-
79	22	"	2E	.
80	22	"	2F	/
81	22	"	30	0
82	22	"	31	1
83	22	"	32	2
84	22	"	33	3
85	22	"	34	4
86	22	"	35	5
87	22	"	36	6
88	22	"	37	7
89	22	"	38	8
90	22	"	39	9
91	22	"	3A	:
92	22	"	3B	;
93	22	"	3C	<
94	22	"	3D	=
95	22	"	3E	>
96	22	"	3F	?
97	23	#	20	SP
98	23	#	21	!
99	23	#	22	"
100	23	#	23	#
101	23	#	24	$
102	23	#	25	%
103	23	#	26	&
104	23	#	27	'
105	23	#	28	(

Decimal Number	P_H		P_L	
	Hex. Code	ASCII Graphic	Hex. Code	ASCII Graphic
106	23	#	29	)
107	23	#	2A	*
108	23	#	2B	+
109	23	#	2C	,
110	23	#	2D	-
111	23	#	2E	.
112	23	#	2F	/
113	23	#	30	0
114	23	#	31	1
115	23	#	32	2
116	23	#	33	3
117	23	#	34	4
118	23	#	35	5
119	23	#	36	6
120	23	#	37	7
121	23	#	38	8
122	23	#	39	9
123	23	#	3A	:
124	23	#	3B	;
125	23	#	3C	<
126	23	#	3D	=
127	23	#	3E	>
128	23	#	3F	?
129	24	$	20	SP
130	24	$	21	!
131	24	$	22	"
132	24	$	23	#

ASCII Control Characters

ASCII control characters, when used in the 3151, perform specific functions. They are assigned X'00' through '20' and '7F' in the 7-bit ASCII code table. X'20' is also used as an ASCII graphic character (space).

ASCII control characters can be received from the host system or entered from the keyboard by pressing the alphanumeric key while holding down the *Ctrl* key. The ASCII control character generated by each alphanumeric key is shown on the front of the key in Figure 6-4 on page 6-126.

Figure 6-5 on page 6-127 shows the ASCII control characters and their mnemonics, meanings, hexadecimal codes, characters displayed on the screen (in transparent mode), keys to generate the ASCII control characters together with the *Ctrl* key, and descriptions.

Note: The ESC, LF, and DEL characters can also be entered using these designated keys.

ASCII Control Characters

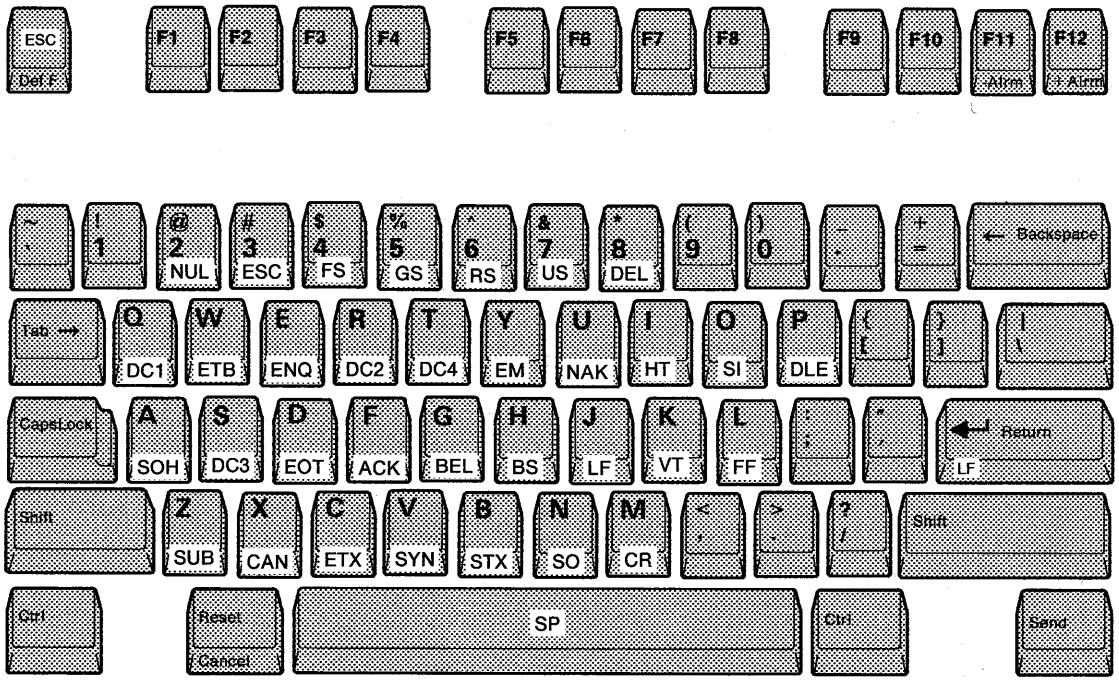


Figure 6-4. ASCII Control Characters Generating Keys

Mnemo-nics	Meaning	Hex. Code	Displayed Character	Key	Description
NUL	Null	X'00'	□	2	Ignored.
SOH	Start of header	X'01'	S_H	A	Ignored.
STX	Start of text	X'02'	S_X	B	Enters transparent mode (DLE STX).
ETX	End of text	X'03'	E_X	C	Exits transparent mode (DLE ETX) or is used as a line turnaround character (LTA).
EOT	End of transmission	X'04'	E_T	D	Mandatory disconnect (DLE EOT) or is used as an LTA.
ENQ	Enquiry	X'05'	E_Q	E	Ignored.
ACK	Acknowledge	X'06'	A_K	F	Ignored.
BEL	Bell	X'07'	B_L	G	Sounds the audible alarm.
BS	Backspace	X'08'	B_S	H	Moves the cursor one position to left.
HT	Horizontal tab	X'09'	H_T	I	Moves the cursor to the next tab stop. (See "Tab" on page 7-21 for more information.)
LF	Line feed	X'0A'	L_F	J	Moves the cursor to the line specified by the ASCII LF parameter.
VT	Vertical tab	X'0B'	V_T	K	Moves the cursor to the next line.
FF	Form feed	X'0C'	F_F	L	When the Scroll parameter is NO, performs an erase input operation. When the Scroll parameter is not NO, moves the cursor to the next line.

Figure 6-5 (Part 1 of 3). ASCII Control Characters

Mnemo-nics	Meaning	Hex. Code	Displayed Character	Key	Description
CR	Carriage return	X'0D'	$_{C}R$	M	Moves the cursor to the first position of the current line or the first position of the next line, or is used as an LTA.
SO	Shift out	X'0E'	$_{S}O$	N	Selects a character that is in the G0 space.
SI	Shift in	X'0F'	$_{S}I$	O	Selects a character that is in the G1 space.
DLE	Data link escape	X'10'	$_{D}L$	P	Generates a DLE sequence with EOT, STX, ETX, DC2, or DC4.
DC1	Device control 1	X'11'	D_1	Q	Restarts transmission during pacing operation (XON character).
DC2	Device control 2	X'12'	D_2	R	Begins a pass-through data stream (DLE DC2).
DC3	Device control 3	X'13'	D_3	S	Stops transmission during pacing operation (XOFF character) or is used as an LTA.
DC4	Device control 4	X'14'	D_4	T	Ends a pass-through data stream (DLE DC4).
NAK	Negative acknowledge	X'15'	$_{N}K$	U	Ignored.
SYN	Synchronous	X'16'	$_{S}N$	V	Ignored.
ETB	End of transmission block	X'17'	$_{E}B$	W	Ignored.

Figure 6-5 (Part 2 of 3). ASCII Control Characters

Mnemo-nics	Meaning	Hex. Code	Displayed Character	Key	Description
CAN	Cancel	X'18'	$^{C}_{N}$	X	Ignored.
EM	End of medium	X'19'	$^{E}_{M}$	Y	Ignored.
SUB	Substitute	X'1A'	?	Z	? is displayed.
ESC	Escape	X'1B'	$^{E}_{C}$	3	Generates an ESC sequence.
FS	File separator	X'1C'	$^{F}_{S}$	4	Ignored.
GS	Group separator	X'1D'	$^{G}_{S}$	5	Ignored.
RS	Record separator	X'1E'	$^{R}_{S}$	6	In a send or read operation, indicates the end of a line for a turnaround character.
US	Unit separator	X'1F'	$^{U}_{S}$	7	Ignored.
DEL	Delete	X'7F'	▒	8	Ignored.

Figure 6-5 (Part 3 of 3). ASCII Control Characters

DLE Sequences

The DLE sequences can be generated from the host system or the keyboard (see "ASCII Control Characters" on page 6-125).

Note: The DLE DC2 and the DLE DC4 sequences cannot be entered from the keyboard.

The following figure shows DLE (data link escape) sequences that the 3151 can accept.

DLE Sequence	Description
DLE EOT	Ends a communication (mandatory disconnect). The DLE EOT sequence is used only on a switched communication network to end the communication. When the DLE EOT sequence is received or entered, the following occurs. 1. The DTR signal is turned off. 2. The display station waits for 500 ms. 3. The DTR signal is turned on again.

DLE Sequence	Description
DLE STX	Enters transparent mode. When the DLE STX sequence is received or entered (Ctrl + P and Ctrl + B), the 3151 enters transparent mode. In this mode, all control characters are displayed on the screen without performing their functions. *Note:* The DLE EOT, the DLE DC2, and the DLE DC4 sequences can be performed in transparent mode. When transparent mode is not allowed by the Set Control 2 command and you enter the DLE STX sequence from the keyboard, the audible alarm will sound. *Note:* The DLE character is displayed only when you press the DLE key (P with control shift) twice in transparent mode, or the host system sends two successive DLE characters to the 3151.
DLE ETX	Exits transparent mode. When the DLE ETX sequence is received or entered (Ctrl + P and Ctrl + C), the 3151 exits transparent mode and all ASCII control characters except the DEL disappear from the screen.
DLE DC2	Begins a pass-through data stream. The DLE DC2 sequence is used to indicate the beginning of the pass-through data stream.
DLE DC4	Ends a pass-through data stream. The DLE DC4 sequence is used to indicate the end of the pass-through data stream.

Chapter 7. Setup Parameters

This chapter describes the 3151 setup parameters. After reading this chapter, you should be able to:

1. Determine your setup values and fill out the setup sheet (Appendix A, "Setup Sheets").

2. Know how to define setup values using the menus.

Contents

Overview

The 3151 provides various programmable setup parameters. Setup parameters **must** be set when the 3151 is installed. Generally, they are defined using setup menus, and once defined can be used at a later time without being changed.

The parameter settings for, such as, Line Wrap, Auto LF (line feed), or New Line may differ depending on the application program. Therefore, the system programmer may prefer to define them by using host commands rather than from the keyboard by an operator.

You can define these setup parameters using seven Set Control commands as well as using setup menus. Figure 7-1 lists the 3151 setup parameters and which command or setup menu to use when defining them.

Notes:

1. *The programmable setup parameters may differ in different machine modes. In the **Mode** column of Figure 7-1, '*' means that the parameter only applies to IBM 3151 and IBM 3101 emulation modes; '**' means that the parameter only applies to IBM 3101 emulation and ten ASCII terminals' emulation modes; '***' means that the parameter only applies to ten ASCII terminals' emulation mode.*

   If no asterisks exist in the column, the parameter applies to all modes.

2. *The Scroll parameter provides two choices for the **Smooth Scroll** function from the setup menu. When using the Set Control 3 command, only **smooth scroll—fast** can be specified for the Smooth Scroll.*

Setup Parameter	Setup Menu	Command	Mode
Machine Mode	GENERAL	Set Control 1	
Screen	GENERAL	Not supported.	
Row and Column	GENERAL	Create Viewport	
Scroll	GENERAL	Set Control 3	
Auto LF	GENERAL	Set Control 3	
CRT Saver	GENERAL	Set Control 2	
Line Wrap	GENERAL	Set Control 3	
Forcing Insert	GENERAL	Set Control 2	*
Tab	GENERAL	Set Control 3	*
Enhance Mode	GENERAL	Enhanced Mode	***
Edit Mode	GENERAL	Not supported.	***
Attribute	GENERAL	Not supported.	***
Term.ID	GENERAL	Not supported.	*
Operating Mode	COMMUNICATION	Set Control 1	
Line Speed (Main)	COMMUNICATION	Set Control 5	
Word Length (Main)	COMMUNICATION	Set Control 5	
Parity (Main)	COMMUNICATION	Set Control 5	
Stop Bit (Main)	COMMUNICATION	Set Control 5	
Turnaround Character (Main)	COMMUNICATION	Set Control 5	
Line Control (Main)	COMMUNICATION	Set Control 5	
Break Signal (Main)	COMMUNICATION	Set Control 5	*
Send Null Suppress (Main)	COMMUNICATION	Set Control 4	*
Pacing (Main)	COMMUNICATION	Not supported.	**
Parity Check (Main)	COMMUNICATION	Set Control 5	***
Enter	KEYBOARD/PRINTER	Set Control 2	*
Return	KEYBOARD/PRINTER	Set Control 3	*
New Line	KEYBOARD/PRINTER	Set Control 2	*
Send	KEYBOARD/PRINTER	Set Control 4	*
Insert Character	KEYBOARD/PRINTER	Set Control 3	*
Lock Command	KEYBOARD/PRINTER	Not supported.	***
Line Speed (AUX.)	KEYBOARD/PRINTER	Set Control 6	
Word Length (AUX.)	KEYBOARD/PRINTER	Set Control 6	
Parity (AUX.)	KEYBOARD/PRINTER	Set Control 6	
Stop Bit (AUX.)	KEYBOARD/PRINTER	Set Control 6	
Characters (AUX.)	KEYBOARD/PRINTER	Set Control 7	*

Figure 7-1 (Part 1 of 2). 3151 Setup Parameters

Setup Parameter	Setup Menu	Command	Mode
Transparent Mode	Not supported.	Set Control 2	*
ASCII LF Character	Not supported.	Set Control 3	*
Lock KBD and Keep MDT Bit	Not supported.	Set Control 4	*
Send Data Format	Not supported.	Set Control 4	*

Figure 7-1 (Part 2 of 2). 3151 Setup Parameters

Setup Menus

The 3151 provides four setup menus that are used when defining setup values (parameters):

- GENERAL
- COMMUNICATION
- KEYBOARD/PRINTER
- FUNCTION.

Each menu, except the FUNCTION menu, contains the setup-value-definition fields. The FUNCTION menu is used, for example, to save the setup-value definitions or to reset the setup-value definitions to the factory-set default values.

When you power-on the 3151 the first time after installation, the GENERAL menu appears informing you to define the setup values. You can also display the menu using the *Setup* key.

Note: The content of the setup menus is different depending on the machine mode.

Setup Menus

The 3151 provides four setup menus that are used when defining setup values (parameters):

- GENERAL
- COMMUNICATION
- KEYBOARD/PRINTER
- FUNCTION.

Each menu, except the FUNCTION menu, contains the setup-value-definition fields. The FUNCTION menu is used, for example, to save the setup-value definitions or to reset the setup-value definitions to the factory-set default values.

When you power-on the 3151 the first time after installation, the GENERAL menu appears informing you to define the setup values. You can also display the menu using the *Setup* key.

Note: The content of the setup menus is different depending on the machine mode.

Setup Menus in IBM 3151 and IBM 3101 Emulation Modes

Figures 7-2 through 7-5 show the 3151 setup menus in IBM 3151 and IBM 3101 emulation modes.

Notes:

1. *The Pacing field in the COMMUNICATION menu disappears when IBM 3151 is selected for the machine mode. Pacing is always set to ON in IBM 3151 mode.*

2. *The Characters field in the KEYBOARD/PRINTER menu disappears for the Model 11.*

```
                    S E T U P    M E N U

  GENERAL      COMMUNICATION     KEYBOARD/PRINTER     FUNCTION

Machine Mode          IBM 3151   Forcing Insert            OFF
Screen                 NORMAL    Tab                     FIELD
Row and Column        24 X 80
Scroll                   JUMP
Auto LF                    ON
CRT Saver                 OFF    Term.ID _____________________
Line Wrap                  ON
```

Figure 7-2. GENERAL Menu in IBM 3151 and IBM 3101 Emulation Modes

```
                    S E T U P    M E N U

  GENERAL      COMMUNICATION     KEYBOARD/PRINTER     FUNCTION

Operating Mode          BLOCK
Line Speed (bps)         9600   Line Control              PRTS
Word Length (bits)          7   Break Signal (ms)          500
Parity                    ODD   Send Null Suppress          ON
Stop Bit                    1   Pacing                      OFF
Turnaround Character      ETX
```

Figure 7-3. COMMUNICATION Menu in IBM 3151 and IBM 3101 Emulation Modes

Setup Menus

Setup Menus in IBM 3151 and IBM 3101 Emulation Modes

Figures 7-2 through 7-5 show the 3151 setup menus in IBM 3151 and IBM 3101 emulation modes.

Notes:

1. *The Pacing field in the COMMUNICATION menu disappears when IBM 3151 is selected for the machine mode. Pacing is always set to ON in IBM 3151 mode.*

2. *The Enter and Characters fields in the KEYBOARD/PRINTER menu disappear for the Model 11.*

```
                    S E T U P    M E N U

  GENERAL     COMMUNICATION     KEYBOARD/PRINTER     FUNCTION

Machine Mode          IBM 3151   Forcing Insert           OFF
Screen                  NORMAL   Tab                    FIELD
Row and Column        24 X 80
Scroll                   JUMP
Auto LF                    ON
CRT Saver                 OFF   Term.ID _____________________
Line Wrap                  ON
```

Figure 7-2. GENERAL Menu in IBM 3151 and IBM 3101 Emulation Modes

```
                    S E T U P    M E N U

  GENERAL     COMMUNICATION     KEYBOARD/PRINTER     FUNCTION

Operating Mode          BLOCK
Line Speed (bps)         9600   Line Control             PRTS
Word Length (bits)          7   Break Signal (ms)         500
Parity                    ODD   Send Null Suppress         ON
Stop Bit                    1   Pacing                    OFF
Turnaround Character      ETX
```

Figure 7-3. COMMUNICATION Menu in IBM 3151 and IBM 3101 Emulation Modes

```
                    S E T U P    M E N U

  GENERAL    COMMUNICATION    KEYBOARD/PRINTER    FUNCTION

KEYBOARD                          PRINTER
  Enter                 RETURN      Line Speed              9600
  Return                FIELD       Word Length (bits)         7
  New Line                CR        Parity                   ODD
  Send                  PAGE        Stop Bit                   1
  Insert Character      MODE        Characters          NATIONAL
```

Figure 7-4. KEYBOARD/PRINTER Menu in IBM 3151 and IBM 3101 Emulation Modes

```
                    S E T U P    M E N U

  GENERAL    COMMUNICATION    KEYBOARD/PRINTER    FUNCTION

      Recall              Save                Default

      Reset Terminal
```

Figure 7-5. FUNCTION Menu in IBM 3151 and IBM 3101 Emulation Modes

Setup Menus in Ten ASCII Terminals' Emulation Mode

Figures 7-6 through 7-9 show the 3151 setup menus in ten ASCII terminals' emulation mode.

Note: Ten ASCII terminals' emulation mode means one of the ADM 3A, ADM 5, ADDS VP A2, HZ1500, TVI910+/910, TVI925E/925, and TVI920/912 modes.

```
                    S E T U P    M E N U

  GENERAL     COMMUNICATION     KEYBOARD/PRINTER     FUNCTION

Machine Mode        TVI925E/925
Screen                NORMAL
Row and Column        24 X 80     Enhance Mode            OFF
Scroll                   JUMP     Edit Mode             DUPLEX
Auto LF                   OFF     Attribute             SCREEN
CRT Saver                 OFF
Line Wrap                  ON
```

Figure 7-6. GENERAL Menu in Ten ASCII Terminals' Emulation Mode

```
                    S E T U P    M E N U

  GENERAL     COMMUNICATION     KEYBOARD/PRINTER     FUNCTION

Operating Mode           ECHO
Line Speed (bps)         9600     Line Control          IPRTS
Word Length (bits)          8
Parity                     NO
Stop Bit                    1     Pacing                  ON
Turnaround Character       CR     Parity Check            ON
```

Figure 7-7. COMMUNICATION Menu in Ten ASCII Terminals' Emulation Mode

```
                    S E T U P    M E N U

  GENERAL    COMMUNICATION    KEYBOARD/PRINTER    FUNCTION

KEYBOARD                          PRINTER
                                    Line Speed            1200
                                    Word Length (bits)       8
                                    Parity                  NO
                                    Stop Bit                 1

  Lock Command          ENABLE
```

Figure 7-8. KEYBOARD/PRINTER Menu in Ten ASCII Terminals' Emulation Mode

```
                    S E T U P    M E N U

  GENERAL    COMMUNICATION    KEYBOARD/PRINTER    FUNCTION

      Recall              Save                Default

      Reset Terminal      Clear Status        Mode Adjust
```

Figure 7-9. FUNCTION Menu in Ten ASCII Terminals' Emulation Mode

How to Define Setup Values Using Menus

Selecting a Menu

The GENERAL menu appears whenever you press the *Setup* key while holding down the *Ctrl* key. You can select the next menu by pressing the *Send* key. Each menu appears in the order of GENERAL, COMMUNICATION, KEYBOARD/PRINTER, then FUNCTION. The current menu name appears in reverse video on the second line of each menu.

To quit a menu without saving the definitions, press the *Setup* key while holding down the *Ctrl* key.

Selecting a Field in the Menu

You can select a field using the *Cursor Move* (← → ↑ ↓) keys. The setup value of the current field is displayed in high-intensity, reverse video.

Selecting Values in the Fields

You can select a value for any field using the *Space Bar*. Press the *Space Bar* until the desired value appears. You only key in characters when defining the terminal ID (identification). If you try to key in characters in any other field, the audible alarm will sound.

Saving the Definitions

When you complete the setup-value definitions for each menu, select the FUNCTION menu to save those values. Select the **Save** field and then press the *Space Bar*. When the save operation successfully completes, **Completed** is displayed (blinking). Notice that the function of the *Space Bar* is different here from the other menus.

Note: During setup mode, on-line operations are interrupted (incoming data is stored in the display station).

Functions Provided by FUNCTION menu

The 3151 has two storage areas for saving the setup-value definitions; VM (volatile memory) and NVM (non-volatile memory). The content of VM is lost when power is turned off; the content of NVM is retained.

When you power-on the 3151 for the first time, NVM contains no values, and initial setup-value definitions are created in VM. These are called *default* values and are used unless you redefine them.

When you power-on the 3151 after saving your setup-value definitions (in NVM), the content of NVM is copied to VM. The 3151 operates **using the setup values in VM.** The content of VM is immediately changed when you select the other setup value by pressing the *Space Bar* in the setup menus. When you perform the save function at this point, the content of VM is copied to NVM enabling them to be used later.

Note: Setup-value definitions are independently saved by the machine modes; IBM 3151, IBM 3101 emulation, and ten ASCII terminals' emulation.

Figure 7-10 on page 7-12 explains each function in IBM 3151 and IBM 3101 emulation modes; Figure 7-11 on page 7-13 explains each function in ten ASCII terminals' emulation mode.

If you select this field and press the space bar	this will occur
Recall	The content of NVM is copied to VM. When the Machine Mode or Operating Mode parameter is changed, "Reset Terminal" is also performed. When the Row and Column parameter is changed, the screen is cleared.
Save	The setup-value definitions defined now and saved in VM are also saved in NVM.
Default	The setup-value definitions set in the factory (except the machine mode and terminal ID) are copied to VM. When the Machine Mode or Operating Mode parameter is changed, "Reset Terminal" is also performed. When the Row and Column parameter is changed, the screen is cleared.
Reset Terminal	The content of NVM is copied to VM and the power-on reset (except checking the internal circuits) is performed.

Figure 7-10. Functions in the FUNCTION Menu in IBM 3151 and IBM 3101 Emulation Modes

If you select this field and press the space bar	this will occur
Recall	The content of NVM is copied to VM. When the Machine Mode parameter is changed, "Reset Terminal" is also performed. When the Row and Column parameter is changed, the screen is cleared.
Save	The setup-value definitions defined now and saved in VM are also saved in NVM.
Default	The setup-value definitions set in the factory (except the machine mode and terminal ID) are copied to VM. When the Machine Mode parameter is changed, "Reset Terminal" is also performed. When the Row and Column parameter is changed, the screen is cleared.
Reset Terminal	The content of NVM is copied to VM and the power-on reset (except checking the internal circuits) is performed.
Clear Status	• The internal receiving queues for the main and auxiliary ports are cleared. • Print mode is set to the page print mode. • Hold-screen status is reset. • Keyboard-lock condition is reset. • Reset write protect and protect modes. • All data transmissions are canceled. • XOFF condition for both the main and auxiliary ports are cleared. • DTR history at auxiliary port is cleared.
Mode Adjust	Some setup values are set to the predefined values (defined by the terminal you want to emulate). Which values are affected depend on the machine mode (see Figure 7-12 on page 7-14). Setup-value definitions in NVM are not affected.

Figure 7-11. Functions in the FUNCTION Menu in Ten ASCII Terminals' Emulation Mode

	ADM 3A	ADM 5	ADDS VP A2	HZ1500	TVI910 TVI910+	TVI925 TVI925E	TVI912 TVI920
Attribute	-	LINE	-	-	LINE	-	-
Auto LF	OFF	OFF	-	-	-	-	-
Default Turnaround Char	-	-	-	-	CR	CR	CR
Enhance Mode	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Line Wrap	-	-	ON	ON	ON	ON	ON
Pacing	OFF	OFF	OFF	OFF	-	-	-
Row and Column	24 x 80	24 x 80	24 x 80	24 x 80	24 x 80	24 x 80	24 x 80
Scroll	JUMP	JUMP	-	JUMP	JUMP	JUMP	JUMP

Figure 7-12. Setup-Value Definitions Set by Mode Adjust Function

Setup Parameter Descriptions

This section explains the setup parameters, their possible values, and their meanings.

Setup Parameters in the GENERAL Menu

Machine Mode

The 3151 supports native mode and the following built-in emulation modes:

- IBM 3101
- TVI925E/925
- TVI920/912
- TVI910+/910
- HZ1500
- ADM3A
- ADM5
- ADDS VP A2.

Notes:

1. *When using an emulation cartridge, machine modes for other types of display terminals are also available.*

2. *IBM 3101 is not supported for the Model 11.*

3. *Machine modes are classified into three groups; IBM 3151, IBM 3101, and ten ASCII terminals. If the machine mode is changed to a new machine mode in a different group, setup-value definitions that are in use are replaced with the ones for the new machine modes and the power-on reset (except the checking of the internal circuits) is performed. If the machine mode group is changed in the setup menu, the setup menu for the new machine mode is then displayed.*

Screen

Possible Values	Description
NORMAL	The whole screen is displayed in normal video.
REVERSE	The whole screen is displayed in reverse video.

Row and Column

One of the following screen sizes (based on the selected rows and columns) can be selected:

- 24 x 80
- 25 x 80
- 24 x 132
- 25 x 132.

Notes:

1. *The content of the screen is cleared when the value is changed.*

2. *24 x 132 and 25 x 132 are not supported for the Model 11.*

Scroll

When the screen is filled with characters, the 3151 can create a null line at the top or the bottom of the screen, which results in all lines moving down or up. Consequently, the previous top or bottom line will be discarded. This operation is called *scrolling*.

There are three types of scrolling; **JUMP**, **SMOOTH S** (slow smooth), and **SMOOTH F** (first smooth). The differences among the types are how the lines are moved up or down (rapidly or smoothly). The slow smooth scrolling cannot be specified by the Set Control 3 command.

Possible Values	Description
JUMP	For example, when the last character of the last line is entered or received, all lines move up rapidly.
SMOOTH F	For example, when the last character of the last line is entered or received, all lines move up slowly (faster than SMOOTH S).
SMOOTH S	For example, when the last character of the last line is entered or received, all lines move up slowly (slower than SMOOTH F).
NO	For example, when the last character of the last line is entered or received, no lines move up.

Notes:

1. *In a formatted page, the Scroll parameter is assumed to be NO, regardless of its setting. (See "Formatted and Unformatted Pages" on page 2-6 for the description of the formatted and unformatted pages.)*

2. *Scrolling can be independently specified for each partition. (See "Viewport, Partition, and Page" on page 2-3 for the description of the partition.)*

3. *SMOOTH S is not supported for the Model 11.*

In an unformatted page, when the cursor is on the bottom line and the Scroll parameter is on (JUMP or SMOOTH); all lines move up when:

- One of the following ASCII control characters is received from the host system or entered from the keyboard.
  - CR, if the Auto LF parameter is ON.
  - LF
  - VT
  - FF

- HT (or the *Tab* key) at the last tab stop, if the Line Wrap parameter is ON.

- The Next Line or the Index command is received.

- An additional character is received from the host system or entered from the keyboard when the cursor is located at the last position of the bottom line and the Line Wrap parameter is ON.

- The Read Line or the Read Message command is received, or the *Send Line* or the *Sn Msg* key is pressed, when the Auto LF parameter is ON.

In an unformatted page, when the cursor is on the top line and the Scroll parameter is on (JUMP or SMOOTH); all lines move down when:

- The Reverse Index command is received.

- The *Back Tab* (← Tab) key is pressed or the Back Tab command is received when the cursor is located at the first tab stop.

When the scroll operation is performed, the previous top or bottom line disappears and a new null line is created. The cursor moves to the newly created top or bottom line.

Auto LF

Possible Values	Description
ON	The cursor moves to the first position of the next line when the CR character is received or entered.
OFF	The cursor moves to the first position of the current line when the CR character is received or entered.

CRT Saver

This parameter is provided to extend the life of the CRT (cathode ray tube).

Possible Values	Description
ON | OFF	When ON is selected, the screen goes blank if no data is received from the host system or entered from the keyboard for 15 minutes. When data is received or entered and this function is active, the screen displays the data again.

Line Wrap

This parameter specifies whether the cursor stays at the last position or the cursor moves to the first position of the next line when the last character of the current line is entered or received.

Note: In block mode or in a formatted page, ON is assumed regardless of the Line Wrap setting. However, if the Forcing Insert parameter is not OFF, the Line Wrap parameter works as it is set.

Possible Values	Description
ON	When the last character of the current line is entered or received, the cursor moves to the first position of the next line. If the Scroll parameter is on (JUMP or SMOOTH) in an unformatted page, the cursor moves to the first position of the newly created bottom line when the last character of the bottom line of the page is entered or received. If the Scroll parameter is NO in an unformatted page, the cursor stays at the last position of the page when the last character of the bottom line of the page is entered or received. The additional character is written over the last character.
OFF	When the last character of the current line is entered or received, the cursor stays at the last position. The additional character is written over the last character.

Forcing Insert

This parameter affects the insert operations.

Notes:

1. *This parameter cannot be selected in ten ASCII terminals' emulation mode.*

2. *When the Forcing Insert parameter is OFF, the Line Wrap parameter is assumed to be ON in block mode or in a formatted page. When the Forcing Insert parameter is not OFF, the Line Wrap parameter works as it is set.*

Possible Values	Description
OFF	If there is no space to insert a character or a null line, the insert operation cannot be done.
LINE	If there is no space to insert a null line and an insert line operation is requested (for example, by the *Ins Ln* key), the current line is replaced with a null line and the remaining lower lines and the previous current line move down one line. The bottom line of the page in an unformatted page (or the bottom line of the field or page whichever comes first in a formatted page) is discarded. *Note:* If the cursor is located on an attribute character, the operation fails.
CHARACTER	If there is no space to insert a character and an insert character operation is requested (for example, by the *Insert* key), a character can be inserted at the cursor position. However, • The last character of the current line is discarded when the Line Wrap parameter is OFF. • The last character in an unformatted page (or the last character of the field or page, whichever comes first, in a formatted page) is discarded when the Line Wrap parameter is ON.
BOTH	Enables the LINE and CHARACTER functions.

Tab

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode.

The 3151 provides two types of tab stops; column and field tabs. *A column tab* is set by the Set Column Tab command and is cleared by the Clear Column Tab or the Clear All Tabs command. *A field tab* is set by the Set Field Attribute command. When an unprotected field is created, the tab stop is also created.

This parameter specifies which tab stop (field or column) is effective in a formatted page.

Possible Values	Description
FIELD	The tab stops provided by the field attribute characters are used regardless of the column-tab definitions.
COLUMN	The column-tab stops are used while the field attribute characters are ignored.

Functions of the Tab → Key: When this key is pressed in an unformatted page, the cursor moves to the next column tab stop.

Notes:

1. *If the cursor is located at the last position of the current line and the Line Wrap parameter is OFF, pressing this key moves the cursor to the first position of the same line.*

2. *If no column tab stop exists and the Line Wrap parameter is ON, pressing this key moves the cursor to the first position of the active page.*

3. *If the cursor is located behind the last tab stop and scrolling is effective, pressing this key causes a scrolling operation.*

When this key is pressed in a formatted page, the cursor moves to the next column tab stop (if the Tab parameter is COLUMN) or to the next field tab stop (if the Tab parameter is FIELD).

Note: If a formatted page has no tab stops (no unprotected fields), pressing this key moves the cursor to the first position of the active page.

The ASCII control character HT (X'09') performs the same function as this key.

Functions of the ← Tab Key: This key performs the same operation as the Tab → key, except the direction (*previous* instead of next).

The Back Tab command performs the same functions as this key.

Enhance Mode

Note: This parameter cannot be selected in IBM 3151 and IBM 3101 emulation modes.

Possible Values	Description
OFF	The commands marked by 'x' in Figure E-2 on page E-9 can be used.
ON	The commands marked by 'x' and 'E' in Figure E-2 on page E-9 can be used.

Edit Mode

Note: This parameter cannot be selected in IBM 3151 and IBM 3101 emulation modes.

Possible Values	Description
DUPLEX	AID (attention identifier) codes are generated and sent to the host system when any edit key (such as *Char Delete*) is pressed.
LOCAL	AID codes are not generated when the edit keys are pressed. In this mode, you can edit text using the edit keys without sending the AID codes.

Attribute

Note: This parameter cannot be selected in IBM 3151 and IBM 3101 emulation modes.

Possible Values	Description
SCREEN	Field attributes are effective for the whole screen.
LINE	Field attributes are effective for the current line.

Term.ID

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode.

The terminal ID is used by the host system to identify each 3151. Up to 20 alphanumeric characters can be assigned.

Setup Parameters in the COMMUNICATION Menu

Note: The following combinations for the Word Length and Parity parameters are not allowed. If selected, they are assumed to be 8-bit (Word Length) and NO (Parity).

- *8-bit (Word Length) and MARK (Parity)*
- *8-bit (Word Length) and SPACE (Parity).*

Operating Mode

The transmitting of data from the 3151 depends on its operating mode. There are three selectable operating modes; block, character, and echo.

Possible Values	Description
Block	Data, which is entered from the keyboard and then displayed on the screen, is sent to the host system when one of the *Send*, the *Send Line*, or the *Sn Msg* keys is pressed, or the Read Page, the Read Line, the Read Message, or the Read All command is received from the host system. An operator can edit data before sending it to the host system. *Note:* When the Forcing Insert parameter is OFF in this mode, the Line Wrap parameter is assumed to be ON, regardless of its setting.
Character	Data entered from the keyboard is immediately sent to the host system and at the same time displayed on the screen (screen is updated).
Echo	Data entered from the keyboard is immediately sent to the host system. The 3151 displays the data when the host system returns it to the 3151.

There are three other modes; local, transparent, and test, which are also related to the 3151 operation.

Mode	Description
Local	The 3151 enters this mode when the *Local* key is pressed. In this mode, communications with the host system (except receiving and responding to the Read Status command, and a pass-through operation) are disabled. The 3151 returns to the previous operating mode when the *Local* key is pressed again.
Transparent	The 3151 enters transparent mode when receiving the specified DLE sequence DLE STX, and exits this mode when receiving the DLE ETX from the host system or the keyboard. (See "DLE Sequences" on page 6-130 for more information.) In this mode, commands are handled as character strings. The ASCII control characters are displayed on the screen without performing their functions. This mode may be used when debugging programs. The pass-through operation can also be done in transparent mode. The Set Control 2 command can disable the 3151 to enter this mode from the keyboard.
Test	The 3151 enters this mode when the *Hold* key is pressed while holding down the *Ctrl* and *Shift* key, and exits this mode when the same operation is performed. In this mode, you can check the keyboard using the test pattern. See *IBM 3151 ASCII Display Station Guide to Operations* for more information.

Line Speed for Main Port

The following line speeds (bps) can be selected for communications with a host system.

50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 9600, 19200, and 38400.

Word Length for Main Port

7-bit or 8-bit can be selected.

Parity for Main Port

This parameter specifies whether to add a parity bit to each data character. The following parity types can be selected:

- ODD
- EVEN
- SPACE
- MARK
- NO.

Note: The 3151 ignores a parity error when SPACE or MARK is selected.

Stop Bit for Main Port

This parameter specifies whether to place one or two bits after each data character.

Turnaround Character for Main Port

For IBM 3151 or IBM 3101 mode: This parameter specifies to generate a line turnaround character (LTA) at the end of the data stream when one of the read commands is received or one of the following keys is pressed:

- Send
- Send Line
- Sn Msg
- Print (if the print key attention is enabled)
- Print Line (if the print key attention is enabled)
- Pr Msg (if the print key attention is enabled)
- Clear
- Reset (if the reset key attention is enabled)
- Program Function (F1 through F36)
- Program access (PA1 through PA3).

These keys are called *block data transmission* keys.

One of the following LTAs can be selected:

- ETX
- CR
- EOT
- DC3.

Note: The inbound and outbound pacing are disabled when DC3 is selected for the LTA.

For ten ASCII terminals' emulation mode: This parameter specifies to generate an LTA at the end of data stream to the host system when the send or send line operation is requested.

One of the following LTAs can be selected:

- ETX
- CR
- EOT.

The selected LTA can be effective when (1) power is turned off and then on, (2) Clear Status function is performed, or (3) Reset Terminal function is performed.

The LTA can also be defined by the Define Delimiter Code command.

The CR character is used as the LTA for AIDs of the Program Function keys.

Line Control for Main Port

Possible Values	Description
PRTS	The 3151 controls the RS-232C signal line using PRTS (permanent request to send). PRTS handles the CTS (clear to send) and DSR (data set ready) as modem signals. *Note:* PRTS requires the full-duplex (FDX) communication facility.
IPRTS	The 3151 controls the RS-232C signal line using IPRTS (induced permanent request to send). IPRTS handles the CTS and DSR signals as if the signals are always on. *Note:* IPRTS requires the full-duplex (FDX) communication facility.
CRTS	The 3151 controls the RS-232C signal line using the CRTS (controlled request to send). CRTS looks at the CTS, DSR and CD (carrier detect) signals to determine the status of the 3151. The 3151 enters *sending mode* when the CD signal is off or enters *receiving mode* when the CD signal is on. *Note:* CRTS requires the half-duplex (HDX) communication facility.

See "Handshaking of RS-232C Interface" on page 8-24 for more information.

Break Signal for Main Port

This parameter specifies the length of the break signal that is sent to the host system when the *Break* key is pressed. 500 ms or 170 ms can be selected.

Send Null Suppress

Possible Values	Description
ON	Trailing null characters are removed when data is sent to the host system.
OFF	Trailing null characters are converted to space characters when data is sent to the host system.

Trailing null characters (X'00') may exist between:

- The last character (not a null) in the unprotected field and the end of the field.
- The last character (not a null) in the line and the end of the line.
- The last character (not a null) in the area specified by the send mark and the end of the area.
- The last character (not a null) in the page and the end of the page.

How the null characters are affected depends on the type of the send or read operation. The following shows the end of the last character area in which the null characters are processed.

Send or Read Operation	Unformatted Page	Formatted Page
Page	EOL	EOF or EOP (whichever comes first) when the default field attribute is enabled. EOF when the default field attribute is disabled.
Message	EOL or cursor (whichever comes first)	EOF or cursor (whichever comes first)
Line	EOL	EOL or EOF (whichever comes first)

Legend:

cursor: cursor position, current cursor address or current buffer address
EOF: end of field
EOL: end of line
EOP: end of page

Note: This parameter is not effective for the Read All command.

Pacing for Main Port

Note: This parameter cannot be selected in IBM 3151 mode; it is always set to ON.

Possible Values	Description
ON | OFF	When ON is selected and the receiving buffer of the 3151 becomes close to full, the 3151 sends the XOFF character to the host system. If the XOFF condition is removed, the 3151 sends the XON character to the host system.

Parity Check for Main Port

Note: This parameter cannot be selected in IBM 3151 and IBM 3101 emulation modes.

Possible Values	Description
ON | OFF	When ON is selected, parity is checked. If a parity error is detected, symbol (? for the IBM 3151 or IBM 3101 mode or @ for ten ASCII terminals' mode) is displayed on the screen.

Setup Parameters in the KEYBOARD/PRINTER Menu

Enter

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode.

This parameter specifies the *Enter* key functions. The *Enter* key does not have its original function. You can define the *Enter* key as a *Send* or a *Return* key. Because the function of the *Send* key is also programmable, the *Enter* key can also work as a *Send Line* key.

Return

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode.

This parameter specifies the *Return* key functions.

Possible Values	Description
FIELD	The functions specified in the New Line parameter are performed when the *Return* key is pressed. However, if the target line is within a protected field, the cursor moves to the first character position of the next unprotected field.
NEW LINE	The functions specified in the New Line parameter are performed when the *Return* key is pressed.

Examples of Return Key Functions

Setup Parameters in the KEYBOARD/PRINTER Menu

Enter

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode and for the Model 11.

This parameter specifies the *Enter* key functions. The *Enter* key does not have its original function. You can define the *Enter* key as a *Send* or a *Return* key. Because the function of the *Send* key is also programmable, the *Enter* key can also work as a *Send Line* key.

Return

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode.

This parameter specifies the *Return* key functions.

Possible Values	Description
FIELD	The functions specified in the New Line parameter are performed when the *Return* key is pressed. However, if the target line is within a protected field, the cursor moves to the first character position of the next unprotected field.
NEW LINE	The functions specified in the New Line parameter are performed when the *Return* key is pressed.

Examples of Return Key Functions

When the Return parameter is NEW LINE in an unformatted page: Pressing this key causes the cursor to move to the first position of the:

- Next line, if the Auto LF parameter is ON and the New Line parameter is CR.
- Line that is two lines below the current line, if the Auto LF parameter is ON and the New Line parameter is CR/LF.
- Current line, if the Auto LF parameter is OFF and the New Line parameter is CR.
- Next line, if the Auto LF parameter is OFF and the New Line parameter is CR/LF.

Notes:

1. *If you press the Return key when the cursor is on the bottom line of the page and the Scroll parameter is NO, the cursor moves to the home position[1] instead of the next line, or to the first position of the second line of the page, instead of the line that is two lines below the current line.*
2. *If you press the Return key when the cursor is on the bottom line of the page and the Scroll parameter is not NO, the cursor moves to the first position of the newly created bottom line.*

   The scrolled lines are:

   - *One line, if the Auto LF parameter is ON and the New Line parameter is CR.*
   - *Two lines, if the Auto LF parameter is ON and the New Line parameter is CR/LF.*

---

1 Means the starting position of the unformatted page, or the first character position of the first unprotected field in a formatted page.

When the Return parameter is NEW LINE in an unformatted page: Pressing this key causes the cursor to move to the first position of the:

- Next line, if the Auto LF parameter is ON and the New Line parameter is CR.
- Line that is two lines below the current line, if the Auto LF parameter is ON and the New Line parameter is CR/LF.
- Current line, if the Auto LF parameter is OFF and the New Line parameter is CR.
- Next line, if the Auto LF parameter is OFF and the New Line parameter is CR/LF.

Notes:

1. *If you press the Return key when the cursor is on the bottom line of the page and the Scroll parameter is NO, the cursor moves to the home position[1] instead of the next line, or to the first position of the second line of the page, instead of the line that is two lines below the current line.*
2. *If you press the Return key when the cursor is on the bottom line of the page and the Scroll parameter is not NO, the cursor moves to the first position of the newly created bottom line.*

   The scrolled lines are:

   - *One line, if the Auto LF parameter is ON and the New Line parameter is CR.*
   - *Two lines, if the Auto LF parameter is ON and the New Line parameter is CR/LF.*

---

1 Means the starting position of the unformatted page, or the first character position of the first unprotected field in a formatted page.

- *No lines, if the Auto LF parameter is OFF and the New Line parameter is CR.*
- *One line, if the Auto LF parameter is OFF and the New Line parameter is CR/LF.*

When the Return Key parameter is FIELD in an unformatted page: The Return Key parameter is ignored and NEW LINE is assumed.

When the Return Key parameter is NEW LINE in a formatted page: The same functions are performed as in an unformatted page, except the scrolling.

Note: In addition, the cursor can also move to the next line in the protected field.

When Return Key parameter is FIELD in a formatted page: The cursor moves to the next line or the first character position of the next unprotected field (if the next line is within a protected field) when the *Return* key is pressed. If the page has no unprotected field, the cursor moves to the first position of the page.

New Line

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode.

This parameter specifies the ASCII control characters that are generated when the *Return* key is pressed.

Possible Values	Description
CR	The *Return* key generates the CR (carriage return) character when the *Return* key is pressed.
CR/LF	The *Return* key generates both the CR and LF (line feed) characters when the *Return* key is pressed.

Send

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode.

This option specifies whether the *Send* key works as the *Send* key or the *Send Line* key, and whether the *Send Line* key works as the *Send Line* key or the *Send* key.

Possible Values	Description
PAGE	The 3151 sends the content of the current page to the host system when the *Send* key is pressed, or sends the current line to the host system when the *Send Line* key is pressed.
LINE	The 3151 sends the content of the current line to the host system when the *Send* key is pressed or sends the content of the current page to the host system when the *Send Line* key is pressed.

Insert Character

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode.

Possible Values	Description
MODE	The 3151 enters insert mode when the *Insert* key is pressed.
SPACE	A space character is inserted after the current cursor position when the *Insert* key is pressed.

Lock Command

Note: This parameter cannot be selected in IBM 3151 and IBM 3101 emulation modes.

Possible Values	Description
ENABLE	The Lock command can be used.
DISABLE	The Lock command cannot be used.

Line Speed for Auxiliary Port

The following line speeds (bps) can be selected for communications with an optional device.

50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 9600, and 19200.

Note: 38400 can also be selected for ten ASCII terminals' emulation mode.

Word Length for Auxiliary Port

7-bit or 8-bit can be selected.

Parity for Auxiliary Port

This parameter specifies whether to add a parity bit to each data character. The following parity type can be selected:

- ODD
- EVEN
- SPACE
- MARK
- NO.

Note: The 3151 ignores a parity error when SPACE or MARK is selected.

Lock Command

Note: This parameter cannot be selected in IBM 3151 and IBM 3101 emulation modes.

Possible Values	Description
ENABLE	The Lock command can be used.
DISABLE	The Lock command cannot be used.

Line Speed for Auxiliary Port

The following line speeds (bps) can be selected for communications with an optional device.

50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 9600, and 19200.

Word Length for Auxiliary Port

7-bit or 8-bit can be selected.

Parity for Auxiliary Port

This parameter specifies whether to add a parity bit to each data character. The following parity type can be selected:

- ODD
- EVEN
- SPACE
- MARK
- NO.

Note: The 3151 ignores a parity error when SPACE or MARK is selected.

Stop Bit for Auxiliary Port

This parameter specifies whether to place one (1) or two (2) bits after each data character.

Characters for Auxiliary Port

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode.

This parameter specifies how the characters are sent to the optional device on the auxiliary port. See "How Characters are Sent to the Optional Device" on page 3-35 for more information.

Possible Values	Description
NATIONAL	The 3151 sends the alphanumeric characters (ASCII graphic characters) to the printer (optional device) when a print operation is requested. Other characters, such as the control characters, are replaced with the space characters and sent to the printer.
ALL	The 3151 sends all characters (with control information to select the character set or character attribute, if necessary) to the printer (optional device) when a print operation is requested. If the printer can handle such information, all characters can be printed correctly (high-intensity, reverse, or underscore may be differently handled).

Stop Bit for Auxiliary Port

This parameter specifies whether to place one (1) or two (2) bits after each data character.

Characters for Auxiliary Port

Note: This parameter cannot be selected in ten ASCII terminals' emulation mode and for the Model 11. For the Model 11, this parameter is always set to NATIONAL.

This parameter specifies how the characters are sent to the optional device on the auxiliary port. See "How Characters are Sent to the Optional Device" on page 3-35 for more information.

Possible Values	Description
NATIONAL	The 3151 sends the alphanumeric characters (ASCII graphic characters) to the printer (optional device) when a print operation is requested. Other characters, such as the control characters, are replaced with the space characters and sent to the printer.
ALL	The 3151 sends all characters (with control information to select the character set or character attribute, if necessary) to the printer (optional device) when a print operation is requested. If the printer can handle such information, all characters can be printed correctly (high-intensity, reverse, or underscore may be differently handled).

Setup Parameters Specified Only by Set Control Commands

Note: These parameters cannot be specified in ten ASCII terminals' emulation mode.

Transparent Mode

This parameter can be specified by the Set Control 2 command.

See page 7-26.

ASCII LF Character

This parameter can be specified by the Set Control 3 command.

This parameter affects the cursor address (when in cursor address mode) or the buffer address (when in buffer address mode). (See "Cursor Address and Buffer Address" on page 2-12 for the addressing mode.)

Possible Values	Description
LINE FEED	The row address of the cursor address or the buffer address increases by 1 when the LF character is entered or received.
NEW LINE	The row address of the cursor address or the buffer address increases by 1 and the column address is set to 001 when the LF character is entered or received.

Lock KBD and Keep MDT Bit

This parameter can be specified by the Set Control 4 command.

Possible Values	Description
OFF	The keyboard stays in the unlocked condition and the MDT bits are reset off after the send or the read operation.
ON	The keyboard is locked and the MDT bits are not affected after the send or the read operation. This setting enables the host system to read the data again when an error is detected during the send operation.

The keyboard lock condition is reset, and the MDT bits are reset off when the "Reset Keyboard Lock and MDT Bit" command is received or the *Cancel* key is pressed.

Send Data Format

This parameter can be specified by the Set Control 4 command.

This parameter specifies the type of data stream that is sent to the host system when one of the read commands is received or one of the send keys is pressed in **block mode**. There are two types of data streams; Text LTA and AID LTA.

Text LTA means field data in a formatted page or line data in an unformatted page. Text LTA is effective only in block mode.

Note: In character or echo mode, AID LTA is always sent when one of the send keys is pressed, regardless of the Send Data Format parameter setting.

When AID LTA is selected, one of the following AID (attention ID) codes is sent followed by a turnaround character (LTA) when one of the send keys is pressed in **block mode**:

- ESC 8 when the *Send* key is pressed.
- ESC SP 8 when the *Sn Msg* key is pressed.
- ESC ! 8 when the *Send Line* key is pressed.

Note: Text LTA is always sent when one of the read commands is received, regardless of the Send Data Format parameter setting.

See "Send/Read Operations" on page 3-21 for more information.

Note: Text LTA is always sent when one of the read commands is received, regardless of the Send Data Format parameter setting.

See "Send/Read Operations" on page 3-21 for more information.

Monitor Printer Status

This parameter can be specified by the Set Control 7 command.

This parameter specifies whether the 3151 monitors the DTR signal on the auxiliary port connector (pin 20).

When "No Monitor" is selected, the 3151 can start data transmission to the optional device, regardless of the DTR signal condition.

When "Monitor" is selected, the 3151 can start data transmission to the optional device when a DTR (+) signal is present, which means that the optional device is ready to operate.

Non-Programmable Setup Parameters

Note: These parameters do not apply to ten ASCII terminals' emulation mode.

This section describes the non-programmable setup parameters that are already defined and cannot be changed.

Response Delay for Main Port

The 3151 sends a response to the host system 100 ms (minimum) after receiving read commands.

Main Port Pacing (IBM 3151 Mode)

Main port pacing is effective when one of the following communication interface and line controls is used:

- EIA RS-232C with PRTS
- EIA RS-232C with IPRTS
- EIA RS-422A (by an optional cartridge).

The 3151 provides both inbound and outbound pacing for the data between the 3151 and the host system.

When the hosts system sends the XOFF (DC3 character) to the 3151, the 3151 stops data transmission to the host system and "HOST BUSY" is displayed in the operator information area. The 3151 starts data transmission again when the XON (DC1 character) is received from the host system.

When the XOFF condition occurs in the 3151, the 3151 sends the XOFF to the host system. The host system must stop data transmission to the 3151. The 3151 sends XON to the host system when the XOFF condition is removed.

Note: The inbound and outbound pacing are disabled when DC3 is selected for the turnaround character.

Non-Programmable Setup Parameters

Note: These parameters do not apply to ten ASCII terminals' emulation mode.

This section describes the non-programmable setup parameters that are already defined and cannot be changed.

Response Delay for Main Port

The 3151 sends a response to the host system 100 ms (minimum) after receiving read commands.

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- EIA RS-232C with PRTS
- EIA RS-232C with IPRTS
- EIA RS-422A (by an optional cartridge).

The 3151 provides both inbound and outbound pacing for the data between the 3151 and the host system.

When the hosts system sends the XOFF (DC3 character) to the 3151, the 3151 stops data transmission to the host system and "HOST BUSY" is displayed in the operator information area. The 3151 starts data transmission again when the XON (DC1 character) is received from the host system.

When the XOFF condition occurs in the 3151, the 3151 sends the XOFF to the host system. The host system must stop data transmission to the 3151. The 3151 sends XON to the host system when the XOFF condition is removed.

Note: The inbound and outbound pacing are disabled when DC3 is selected for the turnaround character.

Auxiliary Port Pacing

The 3151 provides both inbound and outbound pacing for the data between the 3151 and the optional device on the auxiliary port.

When the optional device sends the XOFF (DC3 character) to the 3151, the 3151 stops data transmission to the optional device and "AUX BUSY" is displayed in the operator information area. The 3151 starts data transmission again when the XON (DC1 character) is received from the optional device.

When the XOFF condition occurs in the 3151, the 3151 sends the XOFF to the optional device. The optional device must stop data transmission to the 3151. The 3151 sends XON to the optional device when the XOFF condition is removed.

Pass-through Operations

The 3151 provides both inbound and outbound pass-through operations:

- Outbound pass-through operation

  The 3151 passes the data from the host system and adds a preceding DLE DC2 and a trailing DLE DC4 to the optional device.

- Inbound pass-through operation

  The 3151 separates the data from the optional device into several data blocks, and places the DLE DC2 at the beginning and DLE DC4 at the end of each data block; then sends the data blocks to the host system.

Notes:

1. *The inbound pass-through is not supported for the Model 11.*
2. *The inbound pass-through operation is enabled by the Set Control 6 command.*
3. *The pass-through operation can also be done in transparent mode.*

Auxiliary Port Pacing

The 3151 provides both inbound and outbound pacing for the data between the 3151 and the optional device on the auxiliary port.

When the optional device sends the XOFF (DC3 character) to the 3151, the 3151 stops data transmission to the optional device and "AUX BUSY" is displayed in the operator information area. The 3151 starts data transmission again when the XON (DC1 character) is received from the optional device.

When the XOFF condition occurs in the 3151, the 3151 sends the XOFF to the optional device. The optional device must stop data transmission to the 3151. The 3151 sends XON to the optional device when the XOFF condition is removed.

Pass-through Operations

The 3151 provides both inbound and outbound pass-through operations:

- Outbound pass-through operation

  The 3151 passes the data from the host system and adds a preceding DLE DC2 and a trailing DLE DC4 to the optional device.

- Inbound pass-through operation

  The 3151 separates the data from the optional device into several data blocks, and places the DLE DC2 at the beginning and DLE DC4 at the end of each data block; then sends the data blocks to the host system.

Notes:

1. *The inbound pass-through is not supported for the Model 11.*
2. *The inbound pass-through operation is enabled by the Set Control 6 command.*
3. *The pass-through operation can also be done in transparent mode.*

Outbound Trace

The 3151 provides an outbound data trace function only. The data sent from the host system is transferred to the optional device without data conversion while displaying the same data on the screen when the *Trace* key is pressed. This operation does not affect communications between the host system and the 3151.

Time Fill Character

The 3151 does not place any time fill characters (DEL) at the end of each line of data sent to the optional device.

Print Data Null Suppression

The 3151 removes the trailing null characters of each line of data sent to the optional device.

Print EOL and Line End Character

The 3151 places the CR LF as a line end character for each line of data sent to the optional device.

Monitor Printer Status

The 3151 monitors the DTR signal on the auxiliary port connector (pin 20). A DTR (+) signal means that the optional device is ready to operate.

Outbound Trace

The 3151 provides an outbound data trace function only. The data sent from the host system is transferred to the optional device without data conversion while displaying the same data on the screen when the *Trace* key is pressed. This operation does not affect communications between the host system and the 3151.

Time Fill Character

The 3151 does not place any time fill characters (DEL) at the end of each line of data sent to the optional device.

Print Data Null Suppression

The 3151 removes the trailing null characters of each line of data sent to the optional device.

Print EOL and Line End Character

The 3151 places the CR LF as a line end character for each line of data sent to the optional device.

Chapter 8. Installation Planning

This chapter contains information to help you plan the 3151 installation. It is for physical designers, including electrical engineers, space planners, and system administrators.

Contents

Planning Checklist

Figure 8-1 briefly shows the planning checklist. The checklist contains the steps that should be done before operating the 3151. You should review and do each item step-by-step.

Date	Action
	Identify the person who will be responsible for all phases of the planning and preparation.
	Review Chapter 1, "Introduction" and this chapter; make a site preparation plan.
	Arrange for the installation of communication cables, power receptacles, and wiring.
	Order each 3151 and accessories (if required).
	Complete the site preparation.
	Complete the installation of communication cables, power receptacles, and wiring.
	Review Chapter 7, "Setup Parameters" on page 7-1 and determine your setup values for the 3151; circle the selected values in the setup sheet and give a copy of it to the setup personnel. This will be used when setting up the 3151. *Notes:* *1. You may also need to configure for the host system for the 3151.* *2. If you use the cartridge for emulating another display terminal, review the emulation guide instead, and circle the selected values in the setup sheet in the emulation guide.*

Figure 8-1 (Part 1 of 2). Planning Checklist

Date	Action
	Make sure that the modem (or ROLM data communications equipment) and the host system are ready to operate and that the end connector from the modem or the host system is available.
	Make sure that the 3151s and accessories that were ordered have arrived.
	Set up each 3151 according to the "Set-up Procedures" in the *IBM 3151 ASCII Display Station Guide to Operations.* *Note:* If you use the cartridge for emulating another display terminal, refer to each cartridge's user's guide.

Figure 8-1 (Part 2 of 2). Planning Checklist

3151 Specifications

Physical Characteristics

Video Element	Weight	8.3 kg (18.3 lb)
	Height	328 mm (12.9 in.)
	Width	333 mm (13.1 in.)
	Depth	325 mm (12.8 in.)
Keyboard (with numeric keypad)	Weight	2.5 kg (5.5 lb)
	Height	30 mm (1.2 in.)
	Width	492 mm (19.4 in.)
	Depth	210 mm (8.3 in.)
Keyboard (without numeric keypad)	Weight	1.9 kg (4.2 lb)
	Height	30 mm (1.2 in.)
	Width	408 mm (16.1 in.)
	Depth	190 mm (7.5 in.)
Cartridge	Weight	0.03 kg (0.07 lb)
	Height	3.2 mm (0.13 in.)
	Width	54 mm (2.1 in.)
	Depth	86 mm (3.4 in.)

Figure 8-2. Physical Characteristics of the 3151

Space Requirements

When placing the 3151 in your office, you should consider the clearances that are required to operate and service the 3151. Figure 8-3 shows the minimum clearances for the 3151.

Note: Right and left service clearances can be reduced to the minimum clearances—10 cm (3.9 in.), which are required for cooling and operation for the 3151.

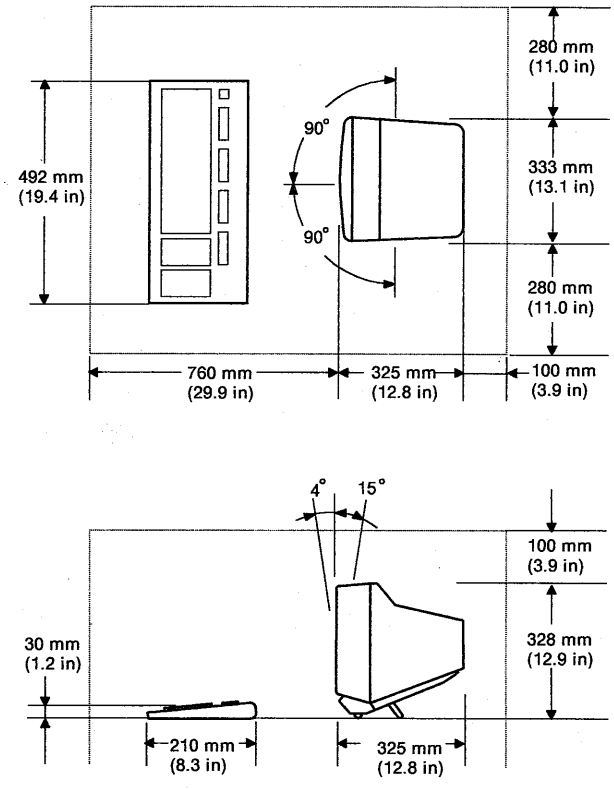


Figure 8-3. Minimum Clearances for the 3151

Environment Requirements

Temperature, Relative Humidity, and Wet Bulb Temperature

The 3151 operates within wide ranges of temperature and relative humidity as show in Figure 8-4.

Operating Environment	Temperature	10°C to 40.6°C (50°F to 105°F)
	Relative Humidity	8% to 80%
	Maximum Wet Bulb	26.7°C (80°F)
Non-operating Environment	Temperature	10°C to 51.7°C (50°F to 125°F)
	Relative Humidity	8% to 80%
	Maximum Wet Bulb	26.7°C (80°F)
Storage Environment	Temperature	0.6°C to 60°C (33°F to 140°F)
	Relative Humidity	5% to 80%
	Maximum Wet Bulb	29.4°C (85°F)
Shipment Environment	Temperature	-20.0°C to 60°C (-4°F to 140°F)
	Relative Humidity	5% to 100%
	Maximum Wet Bulb	29.4°C (85°F)

Figure 8-4. Environment Requirements of the 3151

Airflow

Natural air convection

Electromagnetic Influences

The following can cause strong electromagnetic fields:

- Radio-frequency sources such as transmitting antennas (AM, FM, TV, and two-way radios)
- Radar installations
- Industrial equipment (radio-frequency induction heaters, arc welders, and insulation testers)
- Three-phase power distribution lines
- Transformers
- Distribution panels
- Rotating machinery
- Fluorescent light fixture (within 1 meter from the video element)
- Electric floor heaters.

As a precaution, keep the 3151 away from these magnetic sources. If you fail to do so, you may see distorted characters on the display screen.

Electrostatic Discharge

High electrostatic charges can build up on people and furniture as a result of:

- Contact with high-resistance, floor-surface material
- Contact with carpeting without antistatic properties
- Contact with plastic seat coverings
- Contact with metal-frame furniture
- Very low humidity.

These electrostatic discharges to the metal of the 3151 or to the furniture on which it is placed may affect the 3151.

Lightning Protection

You should plan on installing a lightning protector for your secondary power source when:

- Primary power is supplied by an overhead power service
- The utility company does not install a lightning protector on your primary power source
- The area is subject to electrical storms or similar power surges.

Product and Environment Safety

The following safety factors should be considered:

- Emergency disconnection of power to the branch circuits serving the equipment.
- Clearances for both operating and service personnel. Access clearance for each 3151 must be considered.
- Grounding of branch circuits.
- Lightning protection for power lines and signal lines.

The installation must meet local and national code requirements.

CAUTION

When the video element requires disposal, do not handle it as normal trash, because the video element contains a lithium battery (3 V, 180 mAh, UL[1] recognized component or equivalent). The lithium battery contains 70 mg of lithium and can be harmful to people and may explode if not properly used, handled, or disposed of, such as; (1) thrown into water, (2) overheated to more than 100°C (212°F), or (3) attempting to recharge, repair, or disassemble. When disposing the video element, follow your company's safety procedures or local procedures, which defines the disposal of such items.

1 Registered trademark of Underwriters Laboratories Inc.

Electrical Characteristics

The following shows the electrical characteristics of the 3151. The electrical characteristics are different in each country. See page 8-11 and Figure 8-6 on page 8-12 for the line voltage and plug type of each country.

Line Voltage	See page 8-11
Phase	1
Working Current	0.8 A maximum (125 V ac) or 0.4 A maximum (250 V ac)
Heat Output	88 BTU/hr
kVA	0.09 maximum
Power Cord	2.8 m (9 ft), 3-wire, power cord *Note:* 1.8 m (6 ft) is available as an accessory in the U.S.
Power Plug	See Figure 8-6 on page 8-12

Figure 8-5. Electrical Characteristics of the 3151

Line Voltages

Country	Voltage Range	
	100-127V	200-250V
Argentina		I
Australia		I
Austria		A
Bahamas	H	
Belgium		A
Bolivia	H	
Canada	H	
Chile		D
Colombia	H	
Costa Rica	H	
Denmark		E
Dominican Republic	H	
Ecuador	H	
El Salvador	H	
Finland		A
France		A
Germany		A
Guatemala	H	
Honduras	H	
Hong Kong		B
Indonesia		A
Italy		D

Country	Voltage Range	
	100-127V	200-250V
Japan	H	
Malaysia		B
Mexico	H	
Netherlands		A
New Zealand		I
Norway		A
Panama	H	
Paraguay		I
Peru		J
Philippines	H	
Portugal		A
Singapore		B
South Africa		G
Spain		A
Sweden		A
Switzerland		C
Taiwan	H	
U.K.		B
Uruguay		I
U.S.A.	H	
Venezuela		J

A through J indicate the power plug types in Figure 8-6 on page 8-12.

Power Plug Types

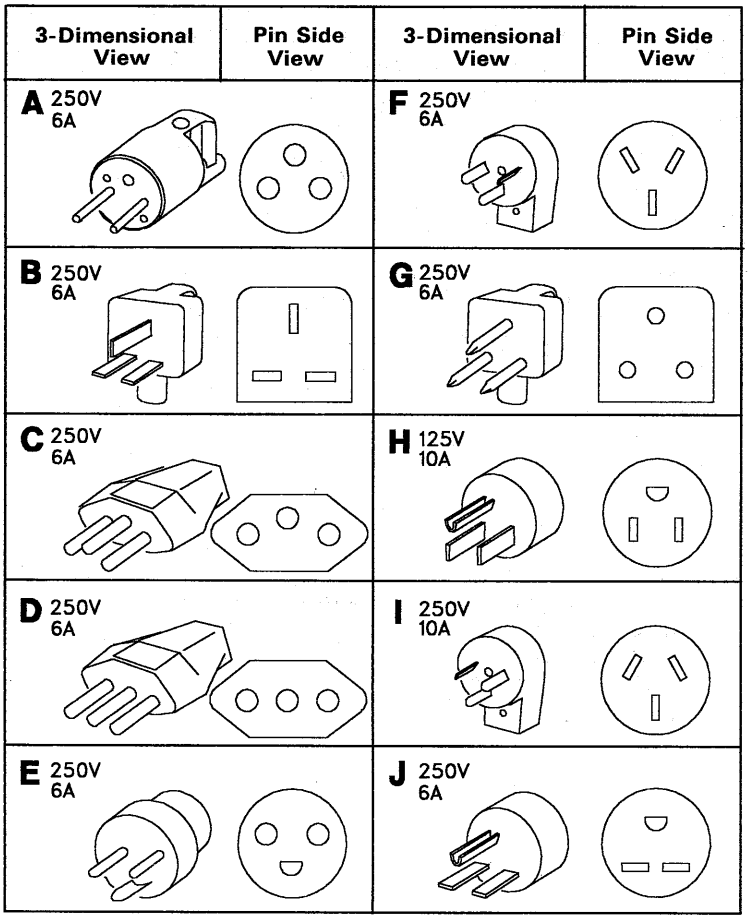


Figure 8-6. Power Plug Types

CAUTION

The power cord plug (when supplied) is approved for use with this display station and meets the relevant testing laboratory, country, or test-house standards. For your safety, the plug must be connected to a properly wired and grounded receptacle. An improperly wired receptacle could place a hazardous voltage on accessible metal parts of the display station. The customer is responsible for receptacle wiring.

Notice for Customers in Chicago, Illinois: Use the 1.8 m (6 ft) power cord.

Acoustic Noise Emission Values

Figure 8-7 shows the typical noise emission values of the 3151. These values are preliminary and are subject to change.

L_{wAd}	Operating (bels)	4
	Idling (bels)	4
L_{pAm}	Operating (dB)	24
	Idling (dB)	24
$<L_{pA}>_m$	Operating (dB)	21
	Idling (dB)	21
Impulsive Noise		No
Prominent Discrete Tones		No

Notes:

L_{wAd} is the declared sound power emission level for a production series of machines.

L_{pAm} is the mean value of the sound pressure emission levels at the operator position (if any) for a production series of machines.

$<L_{pA}>_m$ is the mean value of the space-averaged sound pressure emission levels at the one-meter position for a production series of machines.

All measurements made in accordance with ISO DIS 7779, and reported in conformance with ISO DIS 7574/4.

Figure 8-7. Acoustic Noise Emission Values

Communication Characteristics

This section shows the communication characteristics of the 3151 in IBM 3151 or IBM 3101 emulation mode for the main and auxiliary ports.

Note: If you use an emulation cartridge, refer to the guide shipped with the cartridge for the selectable communication characteristics. Pin assignments on the main and auxiliary ports apply also to the emulation modes.

The following figure shows the locations of the main and auxiliary port connectors.

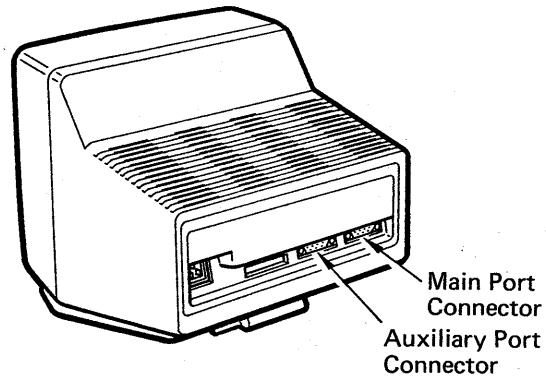


Figure 8-8. Communication Port Connectors

Main Port

Figure 8-9 on page 8-16 shows the communication characteristics between the 3151 and a host system in IBM 3151 or IBM 3101 emulation mode.

Connector	25-pin, female end
Transmission	Asynchronous
Line Code	ANSI X3.4 and ISO 646.
Operating Mode	Block, echo, or character mode
Interface	EIA RS-232C (DTE type) and EIA RS-422A (with an optional cartridge)
Line Speed (bps)	50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 9600, 19200, or 38400
Word Length (bits)	7 or 8
Parity	Odd, even, no, space, or mark
Stop Bit	1 or 2
Send Null Suppress	On or off
Turn Around Character	ETX, CR, EOT, or DC3
Break Signal (ms)	170 or 500
Pacing	On (PRTS or IPRTS is selected in 3151 mode); on or off (IBM 3101 emulation mode)
Line Control	• Echo mode—PRTS or IPRTS • Character mode—PRTS, IPRTS, or CRTS • Block mode—PRTS, IPRTS, or CRTS.

Figure 8-9. Main Port Characteristics

Pin Assignments

Figures 8-10 and 8-11 show the pin assignments on the main port for the EIA RS-232C and RS-422A interfaces, respectively. The RS-422A is available when the '3151 cartridge to emulate IBM and DEC terminals' is used for Models 31 and 41. Pins not explained here are not used in the 3151.

Pin No.	Signal Name	Direction
1	Frame Ground (FG)	
2	Transmitted Data (TD)	Out
3	Received Data (RD)	In
4	Request to Send (RTS)	Out
5	Clear to Send (CTS)	In
6	Date Set Ready (DSR)	In
7	Signal Ground (SG)	
8	Carrier Detect (CD) or Received Line Signal Detector (RLSD)	In
20	Data Terminal Ready (DTR)	Out

Figure 8-10. Pin Assignments on the Main Port (EIA RS-232C)

Pin No.	Signal Name	Direction
1	Frame Ground (FG)	
15	Receive +	In
17	Receive −	In
19	Send +	Out
25	Send −	Out

Figure 8-11. Pin Assignments on the Main Port (EIA RS-422A)

Modem Connection

The example in Figure 8-12 shows the 3151 modem connection using the modem cable (part 6343332).

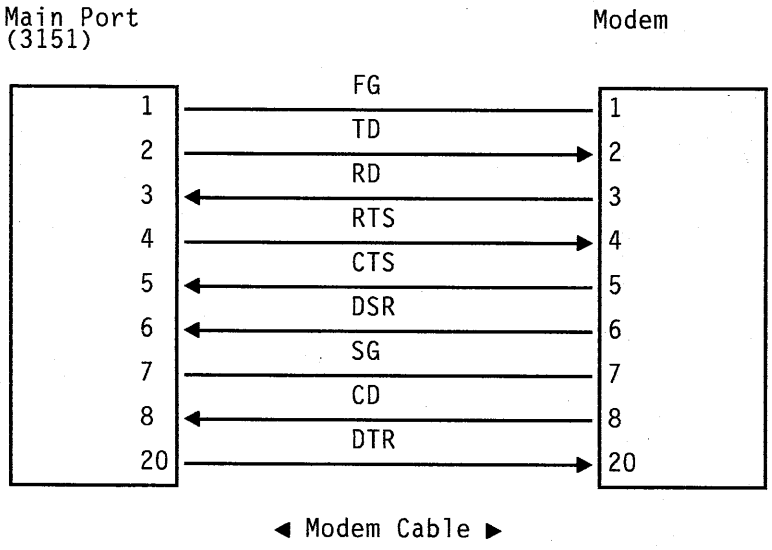


Figure 8-12. Example of the 3151 Modem Connection

Cables

The customer is responsible to prepare cables. The following shows the cables used to connect the 3151 directly to a host system or via a modem (or ROLM data communications equipment):

- **Direct connection to a host system**

  - Shielded twisted-pair cable for the EIA RS-422A or CCITT V.11 interface.

  - 2.4 m (8 ft) cable for the EIA RS-422A or CCITT V.11 interface via the IBM Cabling System. The part number is 8310553.

  - Cable (part 4946680) for the EIA RS-232C or CCITT V.24/V.28 interface to connect to the IBM 8100.

  - Shielded cable for the EIA RS-232C or CCITT V.24/V.28 interface.

  Notes:

  1. *To connect to the IBM Series/1, refer to IBM Series/1 Site Preparation Manual, GA34-0050.*

  2. *When using the EIA RS-422A, the 3151 can be attached directly to a host system, however, the length of the communication (shielded) cable should be less than 1.2 km (4000 ft).*

- **Connection to a modem (or ROLM data communications equipment)**

  3 m (10 ft) cable (part 6343332 or equivalent) for the EIA RS-232C or CCITT V.24/V.28 interface.

Auxiliary Port

Figure 8-13 shows the communication characteristics between the 3151 and an optional device on the auxiliary port in IBM 3151 or IBM 3101 emulation mode.

Connector	25-pin, female end
Transmission	Asynchronous
Line Code	ANSI X3.4 and ISO 646.
Interface	EIA RS-232C (DCE type)
Line Speed (bps)	50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 9600, or 19200
Word Length (bits)	7 or 8
Parity	Odd, even, no, space, or mark
Stop Bit	1 or 2
Print Data Null Suppress	On
Pacing	On

Figure 8-13. Auxiliary Port Characteristics

Pin Assignments

Figure 8-14 shows the pin assignments on the auxiliary port. Pins not explained here are not used in the 3151.

Notes:

1. *You cannot use pins 16, 18, and 22; they are for testing only.*

2. *Pins 4 and 5 are connected together in the video element.*

Pin No.	Signal Name	Direction	Remarks
1	Frame Ground (FG)		
2	Transmitted Data (TD)	In	
3	Received Data (RD)	Out	
4	Request to Send (RTS)	In	
5	Clear to Send (CTS)	Out	
6	Date Set Ready (DSR)	Out	Always on
7	Signal Ground (SG)		
8	Carrier Detect (CD)	Out	Always on
20	Data Terminal Ready (DTR)	In	

Figure 8-14. Pin Assignments on the Auxiliary Port

Printer Connection

The 3151 can start data transmission to the optional device (such as a printer) when the DTR signal from the printer (pin 20) is present. The data is sent to the printer using the RD line (pin 3). When the XON condition occurs in the printer, the printer may send the XOFF signal to the 3151 using the TD line (pin 2). The 3151 suspends data transmission until the printer sends the XON signal. The TD line is also used for pass-through operation from the printer.

The example in Figure 8-15 on page 8-22 shows the 3151 printer connection.

Pin Assignments

Figure 8-14 shows the pin assignments on the auxiliary port. Pins not explained here are not used in the 3151.

Notes:

1. *You cannot use pins 16, 18, and 22; they are for testing only.*

2. *Pins 4 and 5 are connected together in the video element.*

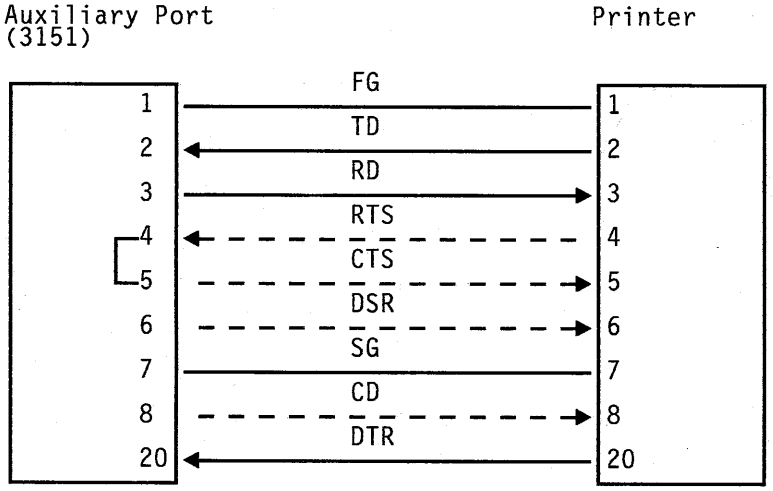
Pin No.	Signal Name	Direction	Remarks
1	Frame Ground (FG)		
2	Transmitted Data (TD)	In	
3	Received Data (RD)	Out	
4	Request to Send (RTS)	In	
5	Clear to Send (CTS)	Out	
6	Date Set Ready (DSR)	Out	Always on
7	Signal Ground (SG)		
8	Carrier Detect (CD)	Out	Always on
20	Data Terminal Ready (DTR)	In	

Figure 8-14. Pin Assignments on the Auxiliary Port

Printer Connection

When the Monitor Printer Status parameter is "No Monitor," the 3151 can start data transmission to the optional device, regardless of the DTR signal condition. When the Monitor Printer Status parameter is "Monitor," the 3151 can start data transmission to the optional device when a DTR (+) signal is present.

The data is sent to the printer using the RD line (pin 3). When the XON condition occurs in the printer, the printer may send the XOFF signal to the 3151 using the TD line (pin 2). The 3151 suspends data transmission until the printer



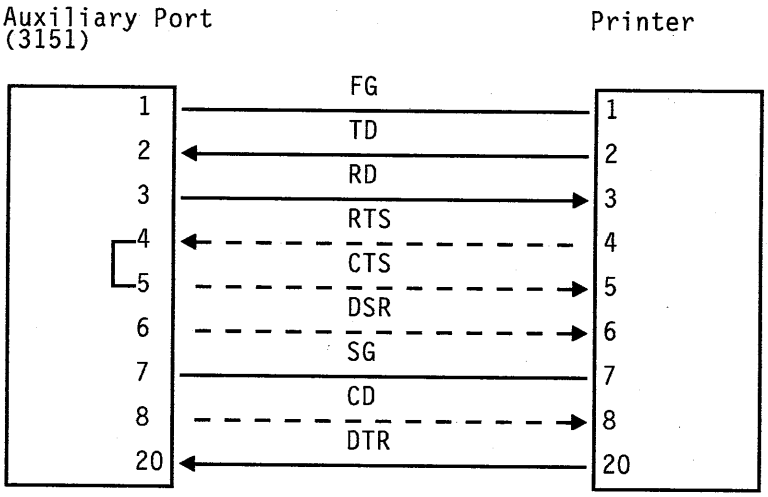
Notes:

1. *A printer regards the auxiliary port as a modem port.*
2. *In most cases, printers do not monitor the DSR and CD (RLSD) signals. Therefore, the DSR and CD connections may not be necessary; refer to the printer's manual.*
3. *The DTR signal must be raised when a print operation is required. If a printer does not send the DTR signal, connect pins 6 and 20 of the auxiliary port to enable a print operation.*
4. *Connections for pins 4, 5, 6, and 8 are optional.*

Figure 8-15. Example of the 3151 Printer Connection

sends the XON signal. The TD line is also used for pass-through operation from the printer.

The example in Figure 8-15 shows the 3151 printer connection.



Notes:

1. *A printer regards the auxiliary port as a modem port.*
2. *In most cases, printers do not monitor the DSR and CD (RLSD) signals. Therefore, the DSR and CD connections may not be necessary; refer to the printer's manual.*
3. *When the Monitor Printer Status parameter is "Monitor," the DTR signal must be raised when a print operation is required. If a printer does not send the DTR signal, connect pins 6 and 20 of the auxiliary port to enable a print operation.*
4. *Connections for pins 4, 5, 6, and 8 are optional.*

Figure 8-15. Example of the 3151 Printer Connection

IBM 4201 Proprinter or IBM 4202 Proprinter XL Connection

The IBM 4201 Proprinter (or IBM 4202 Proprinter XL) with a serial interface can be attached to the 3151 via an I/O cable (part 6343373). Figure 8-16 shows an example of the printer switch settings (on the serial interface module) when the printer is attached to the 3151. Switches A7, B3, B4 must be set as shown in Figure 8-16; other switches may be set differently.

Parameter	Switch	Setting
Line Speed (19200)	A1	On
	A2	On
	A3	On
Parity (EVEN)	A4	On
	A5	On
Pacing (enable)	A6	Off
-	A7	Off
Word Length (8 bit)	B1	Off
Stop Bit (1)	B2	Off
Mode (Normal)	B3	Off
-	B4	Off

Figure 8-16. Example of the Proprinter (XL) Switch Settings

In this case, the setup parameters for the printer must be set in the KEYBOARD/PRINTER menu as follows:

- **Speed**: 19200
- **Word Length**: 8
- **Parity**: EVEN
- **Stop Bit**: 1

Handshaking of RS-232C Interface

Data transmission between the display station and the modem (or the host system) can be started after the connection between them is established. In the establishment process, the display station and the modem check the status of predetermined signals to determine the next action. This procedure is called *handshaking*.

The handshaking differs depending on the transmission direction (from the display station to the modem or converse). It also depends on the line control to be used. The 3151 supports the following three line controls:

- PRTS (permanent request to send) on the full-duplex communication facility
- IPRTS (induced permanent request to send) on the full-duplex communication facility
- CRTS (controlled request to send) on the half-duplex communication facility.

The difference among them in the handshaking is the handling of DSR (data set ready) and CTS (clear to send) signals. In PRTS and IPRTS, two-way communication can be performed at the same time, however in CRTS, only one-way communication can be done at a time.

In data communication, the display station is called data terminal equipment (DTE) and the modem is called data circuit terminating equipment (DCE).

Handshaking in PRTS

When Sending Data from the Display Station to the Modem: The following figure shows the handshaking when data is sent from the DTE to the DCE in PRTS.

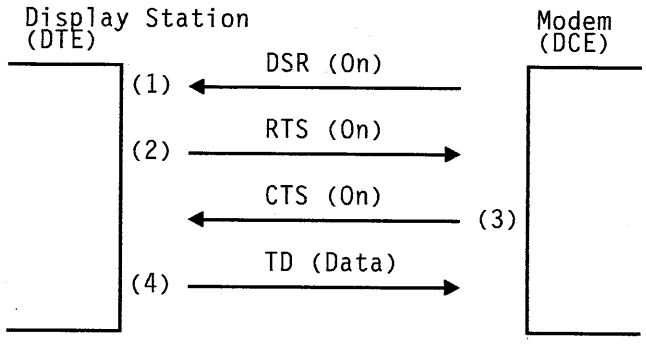


Figure 8-17. Handshaking of RS-232C in PRTS (from DTE to DCE)

Explanation of Figure 8-17 follows:

1. The modem sets the DSR signal to on when the modem's power is turned on.

   Note: If the DSR signal is off, COMM NOT READY 2 is displayed in the operator information area.

2. The display station sets the RTS (request to send) signal to on.

3. The modem sets the CTS signal to on in response to the RTS signal, if the modem is ready to receive data.

   Note: If the CTS signal is off, COMM NOT READY 1 is displayed in the operator information area.

4. The display station starts to send data on the TD (transmitted data) line.

When Sending Data from the Modem to the Display Station: The following figure shows the handshaking when data is sent from the DCE to the DTE in PRTS.

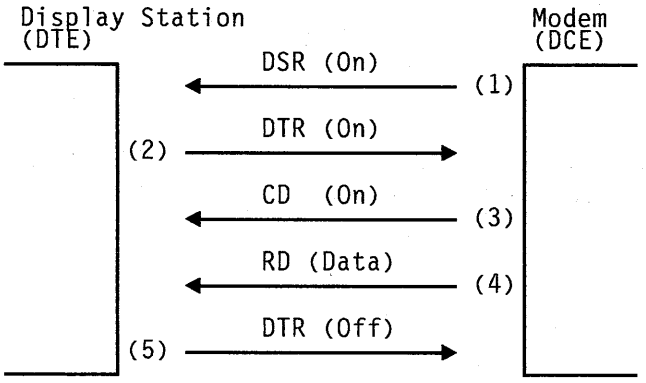


Figure 8-18. Handshaking of RS-232C in PRTS (from DCE to DTE)

Explanation of Figure 8-18 follows:

1. The modem sets the DSR signal to on when the modem's power is turned on.

   Note: If the DSR signal is off, COMM NOT READY 2 is displayed in the operator information area.

2. The display station sets the DTR (data terminal ready) signal to on, if the display station is ready to receive data.

3. The modem sets the CD (carrier detect) signal to on to notify the display station that data transmission will begin.

4. The modem starts to send data on the RD (received data) line.

5. The display station sets the DTR signal to off when the display station wants to disconnect the line.

Handshaking in IPRTS

The handshaking in IPRTS is the same as PRTS, except that IPRTS always assumes that the DSR and CTS signals are on. IPRTS is used to support modems that do not return the CTS signal in response to the RTS signal.

Handshaking in CRTS

Unlike PRTS or IPRTS, CRTS operates on the half-duplex facility. Therefore, a send operation and a receive operation cannot be done at the same time.

When Sending Data from the Display Station to the Modem: The following figure shows the handshaking when data is sent from the DTE to the DCE in CRTS.

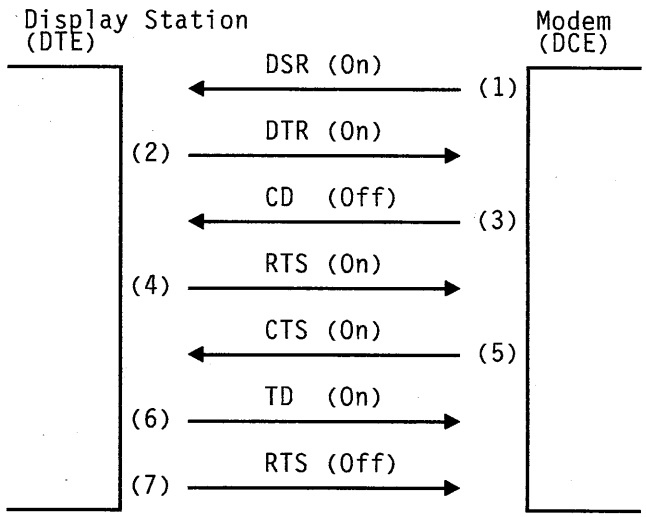


Figure 8-19. Handshaking of RS-232C in CRTS (from DTE to DCE)

Explanation of Figure 8-19 follows:

1. The modem sets the DSR signal to on when the modem's power is turned on.

Note: If the DSR signal is off, COMM NOT READY 2 is displayed in the operator information area.

2. The display station sets the DTR signal to on.

3. The display station checks the CD signal. It must be off to send data from the display station.

4. The display station sets the RTS signal to on.

5. The modem sets the CTS signal to on in response to the RTS signal when the modem is ready to receive data.

   Note: If the CTS signal is off, COMM NOT READY 1 is displayed in the operator information area.

6. The display station starts to send data on the TD (transmitted data) line.

7. The display station sets the RTS signal to off at the completion of sending data (an LTA at the end of data stream is checked).

When Sending Data from the Modem to the Display Station: The following figure shows the handshaking when data is sent from the DCE to the DTE in CRTS.

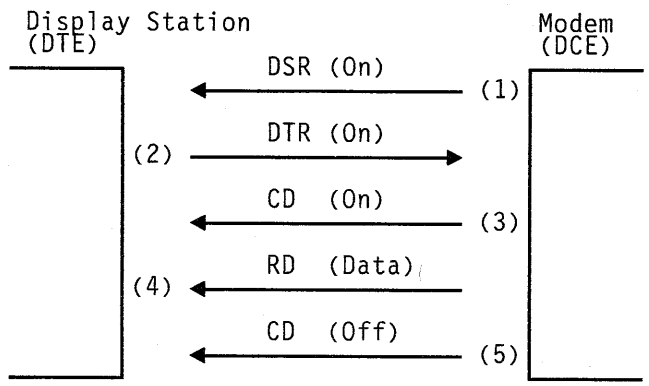


Figure 8-20. Handshaking of RS-232C in CRTS (from DCE to DTE)

Explanation of Figure 8-20 on page 8-29 follows:

1. The modem sets the DSR signal to on when the modem's power is turned on.

   Note: If the DSR signal is off, COMM NOT READY 2 is displayed in the operator information area.

2. The display station sets the DTR signal to on.

3. The modem sets the CD signal to on.

4. The modem starts to send data on the RD line.

5. The modem sets the CD signal to off.

Appendix A. Setup Sheets

This appendix provides setup sheets for IBM 3151 and IBM 3101 emulation, and ten ASCII terminals' emulation modes. Circle the selected values for each parameter in one of the following sheets. This information will be the source when defining the setup values during setup procedures.

Setup Sheet (IBM 3151 and IBM 3101 Emulation)

GENERAL

Machine Mode	IBM 3151* | IBM 3101
Screen	NORMAL* | REVERSE
Row and Column	24 x 80* | 25 x 80 | 24 x 132 | 25 x 132
Scroll	JUMP* | SMOOTH F | SMOOTH S | NO
Auto LF	ON* | OFF
CRT Saver	OFF* | ON
Line Wrap	ON* | OFF
Forcing Insert	OFF* | LINE | CHARACTER | BOTH
Tab	FIELD* | COLUMN
Term.ID (up to 20 characters)	_____

COMMUNICATION

Operating Mode	BLOCK* | ECHO | CHAR
Line Speed (bps)	50 | 75 | 110 | 134.5 | 150 | 200 | 300 | 600 | 1200 | 1800 | 2400 | 3600 | 4800 | 9600* | 19200 | 38400
Word Length (bits)	7* | 8
Parity	ODD* | EVEN | NO| SPACE | MARK
Stop Bit	1* | 2
Turnaround Character	ETX* | CR | EOT | DC3
Line Control	PRTS* | IPRTS | CRTS
Break Signal (ms)	500* | 170
Send Null Suppress	ON* | OFF
Pacing**	OFF* | ON

KEYBOARD/PRINTER

Enter	RETURN* | SEND
Return	FIELD* | NEW LINE
New Line	CR* | CR/LF
Send	PAGE* | LINE
Insert Character	MODE* | SPACE
Line Speed (bps)	50 | 75 | 110 | 134.5 | 150 | 200| 300 | 600 | 1200 | 1800 | 2400 | 3600 | 4800 | 9600* | 19200
Word Length (bits)	7* | 8
Parity	ODD* | EVEN | NO | SPACE | MARK
Stop Bit	1* | 2
Characters	NATIONAL* | ALL

* Indicates the default values (same values as set in the factory).
** The **Pacing** option applies only to IBM 3101 emulation mode; it is always set to on in 3151 mode.

Figure A-1. Setup Sheet for IBM 3151 and IBM 3101 Emulation Modes

Setup Sheet (Ten ASCII Terminals' Emulation)

GENERAL

Machine Mode	TVI925E/925*| TVI920/912 | TVI910+/910 | HZ1500 | ADM3A | ADM5 ADDS VP A2
Screen	NORMAL* | REVERSE
Row and Column	24 x 80* | 25 x 80 | 24 x 132 | 25 x 132
Scroll	JUMP* | SMOOTH F | SMOOTH S | NO
Auto LF	OFF* | ON
CRT Saver	OFF* | ON
Line Wrap	ON* | OFF
Enhance Mode	OFF* | ON
Edit Mode	DUPLEX* | LOCAL
Attribute	SCREEN* | LINE

COMMUNICATION

Operating Mode	ECHO* | CHAR | BLOCK
Line Speed (bps)	50 | 75 | 110 | 134.5 | 150 | 200 | 300 | 600 | 1200 | 1800 | 2400 | 3600 | 4800 | 9600* | 19200 | 38400
Word Length (bits)	8* | 7
Parity	NO* | SPACE | MARK | ODD | EVEN
Stop Bit	1* | 2
Turnaround Character	CR* | EOT | DC3 | ETX
Line Control	IPRTS* | CRTS | PRTS
Pacing**	ON* | OFF
Parity Check**	ON* | OFF

KEYBOARD/PRINTER

Lock Command	ENABLE* | DISABLE
Line Speed (bps)	50 | 75 | 110 | 134.5 | 150 | 200| 300 | 600 | 1200* | 1800 | 2400 | 3600 | 4800 | 9600 | 19200 | 38400
Word Length (bits)	8* | 7
Parity	NO* | SPACE | MARK | ODD | EVEN
Stop Bit	1* | 2

* Indicates the default values (same values as set in the factory).

Figure A-2. Setup Sheet for Ten ASCII terminals' Emulation Mode

Appendix B. Summary of Commands

This appendix summarizes the 3151 commands and responses (including the ASCII control characters and the DLE sequences).

Legend:

ESC:	Escape character
SP:	Space character
LTA:	Turnaround character
BS:	Backspace
`pa1, pa2, etc.:`	Parameter
`op:`	Operation specifier
O:	Outbound command (sent from the host system)
I:	Inbound response (sent from the 3151)
K:	Keyboard entry command
x:	Supported

Format	Function	O	I	K
NUL (Ctrl + 2)	Null			
ETX (Ctrl + C)	LTA (if selected)	x	x	x
EOT (Ctrl + D)	LTA (if selected)	x	x	x
BEL (Ctrl + G)	Bell	x	x	x
BS (Ctrl + H)	Backspace	x	x	x
HT (Ctrl + I)	Tab	x	x	x
LF (Ctrl + J or Ctrl + Return)	Line feed or new line	x	x	x
VT (Ctrl + K)	Line feed	x	x	x
FF (Ctrl + L)	Line feed or erase input	x	x	x
CR (Ctrl + M)	Carriage return, new line, or LTA	x	x	x
SO (Ctrl + N)	Select G1	x	x	
SI (Ctrl + O)	Select G0	x	x	
DLE sequences				

Format	Function	O	I	K
DLE STX (Ctrl + P; Ctrl + B)	Enter transparent mode	X	X	X
DLE ETX (Ctrl + P; Ctrl + C)	Exit transparent mode	X	X	X
DLE EOT (Ctrl + P; Ctrl + D)	Mandatory disconnect	X	X	X
DLE DC2 (Ctrl + P; Ctrl + R)	Begin passthrough data stream	X	X	
DLE DC4 (Ctrl + P; Ctrl + T)	End passthrough data stream	X	X	
DC1 (XON) (Ctrl + Q)	Restart transmission (pacing)	X	X	
DC3 (XOFF) (Ctrl + S)	Stop transmission (pacing)	X	X	
CAN	Cancel	X	X	
ESC 0	Set Column Tab	X		X
ESC 1	Clear Column Tab	X		X
ESC SP 1	Clear All Column Tabs	X		X
ESC 2	Back Tab	X	X	X
ESC 3 pa1 pa2 op	Set Field Attribute	X	X	
ESC 3 pa1 pa2	Set Field Attribute response	X	X	
ESC 4 pa op	Set Character Attribute	X		X
ESC 5	Read Cursor Address	X		
ESC 6	Read Status	X		
ESC 6 pa1 pa2 LTA	Read Status Response		X	
ESC SP 6	Read Model	X		
ESC SP 6 pa LTA	Read Model response		X	
ESC " 6	Read Model (Extended)	X		
ESC " 6 pa1 pa2 pa3 pa4 pa5 LTA	Read Model response		X	
ESC ! 6	Read Terminal ID	X		
ESC ! 6 pa ESC 6 LTA	Read Terminal ID response		X	
ESC SP 7	Read Control 1	X		
ESC SP 7 pa1 pa2 LTA	Read Control 1 response		X	
ESC ! 7	Read Control 2	X		
ESC ! 7 pa1 pa2 LTA	Read Control 2 response		X	
ESC " 7	Read Control 3	X		

Format	Function	O	I	K
ESC " 7 pa1 pa2 LTA	Read Control 3 response		X	
ESC # 7	Read Control 4	X		
ESC # 7 pa LTA	Read Control 4 response		X	
ESC $ 7	Read Control 5	X		
ESC $ 7 pa1 pa2 pa3 pa4 LTA	Read Control 5 response		X	
ESC % 7	Read Control 6	X		
ESC % 7 pa1 pa2 pa3 pa4 LTA	Read Control 6 response		X	
ESC & 7	Read Control 7	X		
ESC & 7 pa1 pa2 pa3 LTA	Read Control 7 response		X	
ESC 8	Read Page/Send Page	X	X	
ESC SP 8	Read Message/Send Message	X	X	
ESC ! 8	Read Line/Send Line	X	X	
ESC # 8	Read All	X		
ESC SP 9 pa1 pa2 op	Set Control 1	X		
ESC ! 9 pa1 pa2 op	Set Control 2	X		
ESC " 9 pa1 pa2 op	Set Control 3	X		
ESC # 9 pa op	Set Control 4	X		
ESC $ 9 pa1 pa2 pa3 pa4 op	Set Control 5	X		
ESC % 9 pa1 pa2 pa3 pa4 op	Set Control 6	X		
ESC & 9 pa1 pa2 pa3 op	Set Control 7	X		
ESC :	Keyboard Lock	X		
ESC ;	Keyboard Unlock	X		
ESC SP :	Begin Outbound Trace	X		
ESC SP ;	End Outbound Trace	X		
ESC % :	Enable Read Unprotected Field	X		
ESC % ;	Disable Read Unprotected Field	X		
ESC & :	Enable Host Protect	X		
ESC & ;	Disable Host Protect	X		
ESC ' :	Enable Default Field Attribute	X		
ESC ' ;	Disable Default Field Attribute	X		
ESC " :	Enable Write Null	X		
ESC " ;	Disable Write Null	X		

Format	Function	O	I	K
ESC) :	Enable Print Key Attention	X		
ESC) ;	Disable Print Key Attention	X		
ESC (:	Enable Reset Key Attention	X		
ESC (;	Disable Reset Key Attention	X		
ESC < pa	Select Character Set G0	X	X	
ESC > pa	Select Character Set G1	X	X	X
ESC = message ESC =	Write Host Message	X		
ESC # ;	Display Host Message	X		
ESC # :	Display Machine Status	X		
ESC , :	Enable Field Attribute Visible Renditions	X		
ESC , ;	Disable Field Attribute Visible Renditions	X		
ESC + :	Enable Partition Separate Line	X		
ESC + ;	Disable Partition Separate Line	X		
ESC * :	Enable OIA Divide Line	X		
ESC * ;	Disable OIA Divide Line	X		
ESC A	Cursor Up	X	X	X
ESC " A	Jump Partition	X	X	X
ESC B	Cursor Down	X	X	X
ESC C	Cursor Right	X	X	X
ESC D	Cursor Left	X	X	X
ESC E	Write Send Mark	X		X
ESC H	Cursor Home	X	X	X
ESC I	Erase EOL/F	X	X	X
ESC J	Erase EOP	X	X	X
ESC K	Erase Input	X	X	X
ESC L	Clear page	X	X	X
ESC ! L	Clear All	X		X
ESC M	Next Line	X		X
ESC SP M	Index	X		X

Format	Function	O	I	K
ESC ! M	Reverse Index	X		X
ESC N	Insert Line	X	X	X
ESC O	Delete Line	X	X	X
ESC P pa	Insert Character	X	X	X
ESC Q	Delete Character	X	X	X
ESC S	Cancel	X		X
ESC SP S	Reset to Initial State	X		
ESC ! S	Reset Keyboard Lock and Keep MDT Bit	X		
ESC U	Print Line	X	X	
ESC V	Print Message	X	X	
ESC W	Print Viewport	X	X	
ESC SP W	Print Screen	X	X	
ESC X pr pc	Set Buffer Address	X	X	
ESC x prh prl pch pcl	Set Buffer Address (Extended)	X	X	
ESC Y pr pc	Set Cursor Address	X	X	
ESC y prh prl pch pcl	Set Cursor Address (Extended)	X	X	
ESC Z	Insert Cursor	X		
ESC SP Z	Reset Buffer Address Mode	X		
ESC a	F1 AID (default format)		X	
ESC ! a	F13 AID (default format)		X	
ESC " a	F25 AID (default format)		X	
ESC b	F2 AID (default format)		X	
ESC ! b	F14 AID (default format)		X	
ESC " b	F26 AID (default format)		X	
ESC c	F3 AID (default format)		X	
ESC ! c	F15 AID (default format)		X	
ESC " c	F27 AID (default format)		X	
ESC d	F4 AID (default format)		X	
ESC ! d	F16 AID (default format)		X	
ESC " d	F28 AID (default format)		X	
ESC e	F5 AID (default format)		X	

Format	Function	O	I	K
ESC ! e	F17 AID (default format)		x	
ESC " e	F29 AID (default format)		x	
ESC f	F6 AID (default format)		x	
ESC ! f	F18 AID (default format)		x	
ESC " f	F30 AID (default format)		x	
ESC g	F7 AID (default format)		x	
ESC ! g	F19 AID (default format)		x	
ESC " g	F31 AID (default format)		x	
ESC h	F8 AID (default format)		x	
ESC ! h	F20 AID (default format)		x	
ESC " h	F32 AID (default format)		x	
ESC i	F9 AID (default format)		x	
ESC ! i	F21 AID (default format)		x	
ESC " i	F33 AID (default format)		x	
ESC j	F10 AID (default format)		x	
ESC ! j	F22 AID (default format)		x	
ESC " j	F34 AID (default format)		x	
ESC k	F11 AID (default format)		x	
ESC ! k	F23 AID (default format)		x	
ESC " k	F35 AID (default format)		x	
ESC l	F12 AID (default format)		x	
ESC ! l	F24 AID (default format)		x	
ESC " l	F36 AID (default format)		x	
ESC ! m	PA1 AID		x	
ESC ! n	PA2 AID		x	
ESC ! o	PA3 AID		x	
ESC SP q pid	Select Host Partition	x	x	
ESC ! q pid	Select Active Partition	x	x	
ESC SP r (.... continued)	Create Viewport	x		
ESC ! = fn fnx ff fp ESC =	Load Programmable Function Key	x		
ESC t fn	Set Default Function Key	x		
ESC SP t	Set All Default Function Keys	x		

Appendix C. AID Codes Generated by Keys

This appendix lists the AID codes generated by keys, and summarizes the functions of the keys. An AID code is transmitted to the host system when the key is pressed.

The following notation is used:

ESC:	Escape character
LTA:	Turnaround character
pa:	Parameter
T:	A control code or an ESC sequence is sent
F:	Function is performed
N:	No function is performed or no characters are sent
S:	A Send operation is started
†:	If the print-key attention is enabled
††:	If the reset-key attention is enabled

Key	Echo Mode	Char Mode	Block Mode	Local Mode	AID Code	Function
ASCII graphic	T	F/T	F	F	ASCII graphic	N
Line-drawing	T	F/T	F	F	Line-drawing	N
ASCII control	T	F/T	F/N	F/N	ASCII control	See page 6-125
DEL	T	T	N	N	DEL	N, and the alarm sounds in block mode
ESC	T	F/T	F	F	ESC	See page 6-4

AID Codes Generated by Keys

Key	Echo Mode	Char Mode	Block Mode	Local Mode	AID Code	Function
LF	T	F/T	F	F	LF	Line feed
↑	T	F/T	F	F	ESC A	Cursor up
↓	T	F/T	F	F	ESC B	Cursor down
→	T	F/T	F	F	ESC C	Cursor right
←	T	F/T	F	F	ESC D	Cursor left
Home	T	F/T	F	F	ESC H	Cursor home
← Backspace	T	F/T	F	F	BS	Backspace
Return	T	F/T	F	F	CR or CR LF	New line
Tab →	T	F/T	F	F	HT	Horizontal tab
← Tab	T	F/T	F	F	ESC 2	Back tab
Enter						Works as Send, Send Line, or Return
Jump	T	F/T	F	F	ESC " A	Jump partition
Clear	T	F/T	F/T	F	ESC L LTA	Clear
Erase EOF	T	F/T	F	F	ESC I	Erase to end of line or field
Erase EOP	T	F/T	F	F	ESC J	Erase to end of page
Er Inp	T	F/T	F	F	ESC K	Erase input
Insert	T	F/T	F	F	ESC P pa	Insert character
Insert	T	F/T	F	F	ESC P SP BS	Insert space
Delete	T	F/T	F	F	ESC Q	Delete character
Ins Ln	T	F/T	F	F	ESC N	Insert line
Del Ln	T	F/T	F	F	ESC O	Delete line
Print Line	F	F	F	F	ESC U LTA†	Print line
Pr Msg	F	F	F	F	ESC V LTA†	Print message
Print	F	F	F	F	ESC W LTA†	Print page
Print with Shift	F	F	F	F	ESC SP W LTA†	Print screen
Cancel	F	F	F	F		Cancel print or send operation

AID Codes Generated by Keys

Key	Echo Mode	Char Mode	Block Mode	Local Mode	AID Code	Function
Send Line	T	T	S	N	ESC ! 8 LTA	Send line
Sn Msg	T	T	S	N	ESC SP 8 LTA	Send message
Send	T	T	S	N	ESC 8 LTA	Send page
F1 - F36	T	F/T	F	F	Character string	Perform the redefined functions
F1	T	T	T	N	ESC a LTA	Default AID
F2	T	T	T	N	ESC b LTA	Default AID
F3	T	T	T	N	ESC c LTA	Default AID
F4	T	T	T	N	ESC d LTA	Default AID
F5	T	T	T	N	ESC e LTA	Default AID
F6	T	T	T	N	ESC f LTA	Default AID
F7	T	T	T	N	ESC g LTA	Default AID
F8	T	T	T	N	ESC h LTA	Default AID
F9	T	T	T	N	ESC i LTA	Default AID
F10	T	T	T	N	ESC j LTA	Default AID
F11	T	T	T	N	ESC k LTA	Default AID
F12	T	T	T	N	ESC l LTA	Default AID
F13	T	T	T	N	ESC ! a LTA	Default AID
F14	T	T	T	N	ESC ! b LTA	Default AID
F15	T	T	T	N	ESC ! c LTA	Default AID
F16	T	T	T	N	ESC ! d LTA	Default AID
F17	T	T	T	N	ESC ! e LTA	Default AID
F18	T	T	T	N	ESC ! f LTA	Default AID
F19	T	T	T	N	ESC ! g LTA	Default AID
F20	T	T	T	N	ESC ! h LTA	Default AID
F21	T	T	T	N	ESC ! i LTA	Default AID
F22	T	T	T	N	ESC ! j LTA	Default AID
F23	T	T	T	N	ESC ! k LTA	Default AID
F24	T	T	T	N	ESC ! l LTA	Default AID
F25	T	T	T	N	ESC " a LTA	Default AID
F26	T	T	T	N	ESC " b LTA	Default AID
F27	T	T	T	N	ESC " c LTA	Default AID
F28	T	T	T	N	ESC " d LTA	Default AID

AID Codes Generated by Keys

Key	Echo Mode	Char Mode	Block Mode	Local Mode	AID Code	Function
F29	T	T	T	N	ESC " e LTA	Default AID
F30	T	T	T	N	ESC " f LTA	Default AID
F31	T	T	T	N	ESC " g LTA	Default AID
F32	T	T	T	N	ESC " h LTA	Default AID
F33	T	T	T	N	ESC " i LTA	Default AID
F34	T	T	T	N	ESC " j LTA	Default AID
F35	T	T	T	N	ESC " k LTA	Default AID
F36	T	T	T	N	ESC " l LTA	Default AID
PA1	T	T	T	N	ESC ! m LTA	Default AID
PA2	T	T	T	N	ESC ! n LTA	Default AID
PA3	T	T	T	N	ESC ! o LTA	Default AID
Trace	F	F	F	N		Outbound
Break	T	T	T	N		Space hold (170 or 500 ms)
Hold	F	F	F	N		Hold screen
Shift	F	F	F	F		Shift up
Ctrl	F	F	F	F		Control shift
Caps Lock	F	F	F	F		Shift lock
Alt Csr	F	F	F	F		Cursor type
Local	F	F	F	F		Local mode
Msg	F	F	F	F		Host message
Def F	F	F	F	F		Function key mode
Reset	F	F	F	F	ESC ! z††	Keyboard unlock
Setup	F	F	F	F		Setup mode
Super	F	F	F	F		Superscript mode
Sub	F	F	F	F		Subscript mode
Line Draw	F	F	F	F		Line-drawing mode
Alrm +	F	F	F	F		Alarm increases
Alrm -	F	F	F	F		Alarm decreases

Appendix D. Summary of Commands in IBM 3101 Emulation Mode

This appendix describes the commands in IBM 3101 Emulation Mode.

Command	Function
ESC 0	Set Tab
ESC 1	Clear Tab
ESC 2	Back Tab
ESC 3 pa	Start Field
ESC 5 ESC 5 pr pc (response)	Read Cursor Address
ESC 6 ESC 6 pa1 pa2 (response)	Read Status
ESC 7 ESC 7 pa1 pa2 (response)	Read Setup Switch
ESC 8	Read Buffer
ESC 9 pa	Set Control
ESC SP 9 pa	Set Control 1 (new command)
ESC A	Cursor Up
ESC B	Cursor Down
ESC C	Cursor Right
ESC D	Cursor Left
ESC E	Write Send Mark
ESC H	Cursor Home

Commands in IBM 3101 Emulation

Command	Function
ESC I	Erase EOF/EOL
ESC J	Erase EOS
ESC K	Erase Input
ESC L	Clear All
ESC N	Insert Line
ESC O	Delete Line
ESC P	Insert Character
ESC Q	Delete Character
ESC S	Cancel
ESC U	Print Line
ESC V	Print Message
ESC W	Print Page
ESC X `pr pc`	Set Buffer Address
ESC Y `pr pc`	Set Cursor Address
ESC Z	Insert Cursor
ESC :	Lock Keyboard
ESC ;	Unlock keyboard

Legend:

ESC:	Escape character
SP:	Space character
`pa1, pa2`, etc.:	Parameter

Appendix E. Summary of Commands in Ten ASCII Terminals' Emulation Mode

This appendix describes the additional (or enhanced) and non-supported commands in ten ASCII terminals' emulation mode.

Note: Ten ASCII terminals' emulation mode means one of the ADM 3A, ADM 5, ADDS VP A2, HZ1500, TVI910+/910, TVI925E/925, and TVI920/912 modes.

Commands not discussed here work as they normally do in each terminal.

Additional or Enhanced Commands

In ten ASCII terminals' emulation mode, the 3151 provides the following additional or enhanced commands and response:

- Set Control 1 command[1]

  ESC SP 9 `pa1 pa2 op`

- Read Control 1 command[1]

  ESC SP 7

- Read Control 1 response[1]

  ESC SP 7 `pa1 pa2`

---

1 Same as the 3151 commands and response.

Note: If the following commands are used in the HZ1500, a ~ sequence is used instead of an ESC.

- Enhance Mode On

  ESC ~ !

- Enhance Mode Off

  ESC ~ SP

In enhance mode, the following commands and response are also available.

- Select Screen Format

  ESC [pr ; pc p

- Extended Set Cursor Address

  ESC [pr ; pc H

- Extended Read Cursor Address

  ESC [6 n

- Extended Report Cursor Address (response)

  ESC [pr ; pc R

Enhance Mode On Command

This command is used to operate the 3151 in enhance mode.

Format

ESC ~ !

Enhance Mode Off Command

This command is used to reset the enhance mode and conditions set by the enhanced commands.

Format

ESC ~ SP

Select Screen Format Command

Four screen formats are available for the 3151.

- 80 columns and 24 rows (1920 characters)
- 80 columns and 25 rows (2000 characters)
- 132 columns and 24 rows (3168 characters)
- 132 columns and 25 rows (3300 characters).

You can select a screen format by using the Select Screen Format command or from the GENERAL menu. When this function is performed, the contents of the screen are erased.

Format

ESC [pr ; pc p

Parameter	Name	Description
pr	Number of Rows	Specifies the height of the screen. **0** Default (24 rows) **1** 24 rows **2** Not used **3** 25 rows
pc	Number of Columns	Specifies the width of the screen. **0** Default (80 columns) **1** 80 columns **2** 132 columns

Figure E-1. Select Screen Format Parameters

Example

- 80 columns and 24 rows

  ESC [1 ; 1 p

- 132 columns and 24 rows

  ESC [1 ; 2 p

- 80 columns and 25 rows

  ESC [3 ; 1 p

- 132 columns and 25 rows

  ESC [3 ; 2 p

Extended Set Cursor Address Command

This command is used to move the cursor to any position (1 through 25 for the row address and 1 through 132 for the column address) on the screen.

Format

ESC [pr ; pc H

where, pr is a two-digit column address (01 through 25) and pc is a three-digit row address (001 through 132).

Example

To move the cursor to row 1 and column 120, use

ESC [0 1 ; 1 2 0 H

Extended Read Cursor Address Command

This command is used to read the cursor address. The Extended Report Cursor Address response is returned when this command is received.

Format

ESC [6 n

Extended Report Cursor Address Response

This response is returned when the Extended Read Cursor Address command is received.

Format

ESC [pr ; pc R

where, pr is a two-digit column address (01 through 25) and pc is a three-digit row address (001 through 132).

Example

When the cursor is located at row 25 and column 98, the response is:

ESC [2 5 ; 0 9 8 R.

Non-supported Commands

In ten ASCII terminals' emulation mode, the 3151 does not support, and ignores the following commands.

- Set Terminal's Time of Day Clock

  ESC SP 1 N HH MM

- Send Time of Day

  ESC SP 2

- Keyclick Off

  ESC <

- Keyclick On

  ESC >

- Move to Previous Page

  ESC J

- Move to Next Page

  ESC K

- Run Self Test

  ESC V

  Note: The Run Self Test command is replaced with the internal check program, which is automatically run each time the 3151 is powered-on or when in test mode.

- Autopage Mode On (Auto Flip On)

ESC v

- Autopage Mode Off (Auto Flip Off)

  ESC w

Summary of Commands

The following pages show the commands (including the ASCII control characters) that are valid in ten ASCII terminals' emulation mode.

The following notation is used:

x: Supported as *Default*
E: Supported in enhance mode

Note: Commands supported in enhance mode originate in the TeleVideo Models 925 and 925E.

Escape Sequences

Note: In the HZ1500, a ~ sequence is used instead of an ESC sequence. An ESC should be replaced with a ~.

Command	Function	TVI910 TVI910+	TVI912 TVI920	TVI925 TVI925E	ADDS VP A2	ADM 5	ADM 3A	HZ1500
ESC "	Unlock Keyboard	x	x	x				E
ESC #	Lock Keyboard	x	x	x				E
ESC &	Protect Mode On	x	x	x			E	E
ESC '	Protect Mode Off	x	x	x			E	E
ESC (	Write Protect Mode Off	x	x	x			E	
ESC (	Set Normal Intensity					x		
ESC)	Write Protect Mode On	x	x	x			E	
ESC)	Set Half Intensity					x		
ESC *	Clear All (Null)	x	x	x	E	E	E	E
ESC +	Clear Unprotected Characters (Space)	x		x			E	E
ESC +	Clear All (Space)		x		E	E		
ESC ,	Clear All (Half Intensity Space)	x	E	x			E	E
ESC - *prc*	Set Cursor's Page, Row, and Column		x	x				
ESC . *n*	Set Attribute for Cursor	x	E	x	E	E	E	E
ESC /	Read Cursor's Page, Row, and Column		x	x				
ESC 0	Set Attribute				x			
ESC 1	Set Tab	x	x	x	E	E	E	E
ESC 2	Clear Tab	x	x	x	E	E	E	E
ESC 3	Clear All Tabs	x	x	x		E	E	E
ESC 3	Buffered Transparent Print Mode On				x			
ESC 4	Send Unprotected Characters in Line	x	x	x			E	E
ESC 4	Buffered Transparent Print Off				x			

Figure E-2 (Part 1 of 4). Escape Sequences

Escape Sequences

Note: In the HZ1500, a ~ sequence is used instead of an ESC sequence. An ESC should be replaced with a ~.

Command	Function	TVI910 TVI910+	TVI912 TVI920	TVI925 TVI925E	ADDS VP A2	ADM 5	ADM 3A	HZ1500
ESC "	Unlock Keyboard	x	x	x				E
ESC #	Lock Keyboard	x	x	x				E
ESC &	Protect Mode On	x	x	x			E	E
ESC '	Protect Mode Off	x	x	x			E	E
ESC (	Write Protect Mode Off	x	x	x			E	
ESC (	Set Normal Intensity					x		
ESC)	Write Protect Mode On	x	x	x			E	
ESC)	Set Half Intensity					x		
ESC *	Clear All (Null)	x	x	x	E	E	E	E
ESC +	Clear Unprotected Characters (Space)	x		x			E	E
ESC +	Clear All (Space)		x		E	E		
ESC ,	Clear All (Half Intensity Space)	x	E	x			E	E
ESC - *prc*	Set Cursor's Page, Row, and Column		x	x				
ESC . *n*	Set Attribute for Cursor	x	E	x	E	E	E	E
ESC /	Read Cursor's Page, Row, and Column		x	x				
ESC 0	Set Attribute				x			
ESC 1	Set Tab	x	x	x	E	E	E	E
ESC 2	Clear Tab	x	x	x	E	E	E	E
ESC 3	Clear All Tabs	x	x	x		E	E	E
ESC 3	Buffered Transparent Print Mode On				x			
ESC 4	Send Unprotected Characters in Line	x	x	x			E	E
ESC 4	Buffered Transparent Print Off				x			

Figure E-2 (Part 1 of 4). Escape Sequences

Command	Function	TVI910 TVI910+	TVI912 TVI920	TVI925 TVI925E	ADDS VP A2	ADM 5	ADM 3A	HZ1500
ESC 5	Send Unprotected Characters in Page	x	x	x			E	E
ESC 5	Lock Keyboard				x			
ESC 6	Send Line	x	x	x		E	E	E
ESC 6	Unlock Keyboard				x			
ESC 7	Send Page	x	x	x	E	E	E	E
ESC :	Clear Unprotected Characters (Null)	x	x	x			E	E
ESC ;	Clear Unprotected Characters (Space)	x	x	x			E	E
ESC ;	Clear All Tabs				E			
ESC = *rc*	Set Cursor Address	x	x	x	E	x	x	E
ESC ?	Read Cursor Address	x	x	x	E	E	E	
ESC @	Buffered Extension Print Mode On	x	x	x		E	E	E
ESC A	Buffered Extension Print Mode Off	x	x	x		E	E	E
ESC B	Block Mode On	E	x	x	E	E	E	E
ESC C	Conversation Mode On	E	x	x	E	E	E	E
ESC E	Insert Line (Space)	x	x	x	E	E	E	
ESC G	Reverse/Normal Video					x		
ESC G *n*	Define Visual Attribute	x	E	x	E		E	E
ESC I	Back Tab	x	x	x	E	E	E	E
ESC K	Erase Line (Space)				x			
ESC L	Print Page with Time			x				
ESC M	Send Terminal ID	E	E	x				
ESC O	No Scroll				E	E	E	E
ESC P	Print Page	E	x	x	E	E	E	E
ESC Q	Insert Character	x	x	x	E	E	E	E
ESC R	Delete Line	x	x	x	E	E	E	E
ESC S	Send Unprotected Message	x	E	x	E			E
ESC S	Send Whole Page Unprotected	x	x					
ESC T	Erase to End of Line (Space)	x	x	x		x	E	E
ESC U	Monitor Mode On	x	E	x	E	E	E	E
ESC W	Delete Character	x	x	x	E	E	E	E
ESC X	Monitor Mode Off	x	E	x	E	E	E	E

Figure E-2 (Part 2 of 4). Escape Sequences

Command	Function	TVI910 TVI910+	TVI912 TVI920	TVI925 TVI925E	ADDS VP A2	ADM 5	ADM 3A	HZ1500
ESC 5	Send Unprotected Characters in Page	x	x	x			E	E
ESC 5	Lock Keyboard				x			
ESC 6	Send Line	x	x	x		E	E	E
ESC 6	Unlock Keyboard				x			
ESC 7	Send Page	x	x	x	E	E	E	E
ESC :	Clear Unprotected Characters (Null)	x	x	x			E	E
ESC ;	Clear Unprotected Characters (Space)	x	x	x			E	E
ESC ;	Clear All Tabs				E			
ESC = *rc*	Set Cursor Address	x	x	x	E	x	x	E
ESC ?	Read Cursor Address	x	x	x	E	E	E	
ESC @	Buffered Extension Print Mode On	x	x	x		E	E	E
ESC A	Buffered Extension Print Mode Off	x	x	x		E	E	E
ESC B	Block Mode On	x	x	x	E	E	E	E
ESC C	Conversation Mode On	x	x	x	E	E	E	E
ESC E	Insert Line (Space)	x	x	x	E	E	E	
ESC G	Reverse/Normal Video					x		
ESC G *n*	Define Visual Attribute	x	E	x	E		E	E
ESC I	Back Tab	x	x	x	E	E	E	E
ESC K	Erase Line (Space)				x			
ESC L	Print Page with Time			x				
ESC M	Send Terminal ID	E	E	x				
ESC O	No Scroll				E	E	E	E
ESC P	Print Page	E	x	x	E	E	E	E
ESC Q	Insert Character	x	x	x	E	E	E	E
ESC R	Delete Line	x	x	x	E	E	E	E
ESC S	Send Unprotected Message	x	E	x	E			E
ESC S	Send Whole Page Unprotected	x	x					
ESC T	Erase to End of Line (Space)	x	x	x		x	E	E
ESC U	Monitor Mode On	x	E	x	E	E	E	E
ESC W	Delete Character	x	x	x	E	E	E	E
ESC X	Monitor Mode Off	x	E	x	E	E	E	E

Figure E-2 (Part 2 of 4). Escape Sequences

Command	Function	TVI910 TVI910+	TVI912 TVI920	TVI925 TVI925E	ADDS VP A2	ADM 5	ADM 3A	HZ1500
ESC Y	Erase to End of Page (Space)	x	x	x		x	E	E
ESC Y	Set Cursor Address				x			
ESC [*Pr*	Set Cursor Row	x						
ESC [	Extended command	E	E	x	E	E	E	E
ESC] *Pc*	Set Cursor Column	x						E
ESC ^	Set Blink Start		x					
ESC _	Set Blank Start		x					
ESC `	Buffered Transparent Print Mode On	x	E	x		E	E	E
ESC a	Buffered Transparent Print Mode Off	x	E	x		E	E	E
ESC b	Reverse Video	E	E	x	E	E	E	E
ESC d	Normal Video	E	E	x	E	E	E	E
ESC f	Program Message Line (OIA)	E	E	x	E	E	E	E
ESC g	Turn On Message Line (OIA)	E	E	x	E	E	E	E
ESC h	Turn Off Message Line (OIA)	E	E	x	E	E	E	E
ESC i	Tab (protect mode)	x	x	x			E	E
ESC j	Cursor Up: Scroll	E		x	E	E	E	E
ESC j	Set Reverse Start		x					
ESC k	Local Edit Mode On	x		x				
ESC k	Set Reverse End		x					
ESC k	Erase to End of Page (Space)				x			
ESC l	Duplex Edit Mode On	x		x				
ESC l	Set Underline Start		x					
ESC m	Set Underline End		x					
ESC n	Turn Screen On	E	E	x	E	E	E	E
ESC o	Turn Screen Off	E	E	x	E	E	E	E
ESC p *n*	Define Page Print Terminator	E	E	x	E	E	E	E
ESC q	Set Blink/Blank End		x					

Figure E-2 (Part 3 of 4). Escape Sequences

Command	Function	TVI910 TVI910+	TVI912 TVI920	TVI925 TVI925E	ADDS VP A2	ADM 5	ADM 3A	HZ1500
ESC s	Send Whole Message	x	E	x	E	E	E	E
ESC s	Send Whole Page All		x					
ESC t	Erase to End of Line (Null)	x	x	x	E	E	E	E
ESC u	Monitor Mode Off	x	E	x	E	E	E	E
ESC v	Scroll Off	E	E	x	E	E	E	E
ESC w	Scroll On	E	E	x	E	E	E	E
ESC x *n p q*	Define Delimiter Code	x	E	x	E	E	E	E
ESC y	Erase to End of Page (Null)	x	x	x	E	E	E	E
ESC ~ 1	Software Reset	x	x	x	x	x	x	x
ESC ~ 0	Reset to Default	x	x	x	x	x	x	x
ESC ~ !	Enhance Mode On	x	x	x	x	x	x	x
ESC ~ SP	Enhance Mode Off	x	x	x	x	x	x	x

Figure E-2 (Part 4 of 4). Escape Sequences

ASCII Control Characters

Control Code	Function	TVI910 TVI910+	TVI912 TVI920	TVI925 TVI925E	ADDS VP A2	ADM 5	ADM 3A	HZ1500
SOH	Home				x			
STX	Unlock Keyboard				x			
EOT	Lock Keyboard				x			
ENQ	Send Terminal ID				E	x	x	E
~ ENQ	Read Cursor Address							x
ACK	Cursor Right				x			
~ ACK	Unlock Keyboard							x
BEL	Bell	x	x	x	x	x	x	x
BS	Cursor Left	x	x	x	x	x	x	x
HT	Tab	x	x	x	E	E	E	x
LF	Cursor Down with Scroll	x	x	x	x	x	x	x
VT	Cursor Up without Scroll	x	x	x		x	x	
VT	Set Cursor Row				x			
~ VT	Cursor Down without Scroll							x
FF	Cursor Right	x	x	x		x	x	
FF	Clear All (Null)				x			
~ FF	Cursor Up without Scroll							x
CR	Return	x	x	x	x	x	x	x
SO	Disable XON/XOFF	x		x				
SO	Set Tag				x			
SO	Unlock Keyboard					x	x	
SO	Bi-directional Print Mode On					x		
SI	Enable XON/XOFF	x		x				
SI	Reset Tag				x			
SI	Lock Keyboard					x	x	
SI	Bi-directional Print Mode Off					x		
~ SI	Erase to End of Line (Space)							x
DLE	Set Cursor Column				x			
DLE	Cursor Right							x

Figure E-3 (Part 1 of 2). ASCII Control Characters

Control Code	Function	TVI910 TVI910+	TVI912 TVI920	TVI925 TVI925E	ADDS VP A2	ADM 5	ADM 3A	HZ1500
~ DC1	Set Cursor Address							x
DC2	Bidirectional Port Communication On	E	E	x		E	E	E
DC2	Buffered Extension Print Mode On				x			
~ DC2	Home							x
~ DC3	Delete Line							x
DC4	Bidirectional Port Communication Off	E	E	x		E	E	E
DC4	Buffered Extension Print Mode Off				x			
NAK	Cursor Left				x			
~ NAK	Lock Keyboard							x
SYN	Cursor Down without Scroll	x		x				
ETB	Cursor Display Disable				x			
~ ETB	Erase to End of Page (Space)							x
CAN	Erase to End of Field (Space)	E		x				
CAN	Cursor Display Enable				x			
~ CAN	Erase End of Page (Space)							x
~ EM	Write Protect Mode On							x
SUB	Clear Unprotected Characters (Space)	x	x	x				
SUB	Cursor Up without Scroll				x			
SUB	Clear All (Null)					x	x	
~ SUB	Insert Line (Space)							x
ESC	Command Sequence Introducer	x	x	x	x	x	x	
~ FS	Clears All (Space)							x
~ GS	Clears Unprotected Characters (Space)							x
RS	Cursor Home	x	x	x		x	x	
US	Return New Line	x	x	x	E	E	E	E
~ US	Write Protect Mode Off							x
DEL	Display DEL Character				x			

Figure E-3 (Part 2 of 2). ASCII Control Characters

AID Codes Generated by Keys

The following pages show the AID codes generated by keys in each emulation mode. An AID code is transmitted to the host system, or the function is performed when each key is pressed.

The following notation is used:

ESC:	Escape character
T:	A control character or an ESC sequence is sent
F:	Function is performed
( ):	Applies only to enhance mode.

Key	Echo Mode	Char Mode	Block Mode	AID Code
↑	T	F/T	F	VT
↑ with Shift	(F)	(F)	(F)	(ESC j)
↓	T	F/T	F	LF
↓ with Shift	T	F/T	F	LF
←	T	F/T	F	BS
→	T	F/T	F	FF
Answr	F	F	F	ENQ
← Backspace	T	F/T	F	BS
CE				
Char Delete	(F)	(F)	(F)	(ESC W)
Char Insert	(F)	(F)	(F)	(ESC Q)
Clear				
Clear with Shift	F	F	F	SUB
Enter	T	F/T	F	CR
Home	T	F/T	F	RS
Line Delete	(F)	(F)	(F)	(ESC R)
Line Erase	(F)	(F)	(F)	(ESC T)
Line Erase with Shift				
Line Insert	(F)	(F)	(F)	(ESC E)
Page Erase	(F)	(F)	(F)	(ESC Y)
Page Erase with Shift				
Print	(F)	(F)	(F)	(ESC P)
Send	(F)	(F)	(F)	(ESC 7)
Send with Shift				
Tab →	(T)	(F/T)	(F)	(HT)
← Tab	(F)	(F)	(F)	(ESC I)

Figure E-4. AID Codes in ADM 3A Mode

Key	Echo Mode	Char Mode	Block Mode	AID Code
↑	T	F/T	F	VT
↑ with Shift	(F)	(F)	(F)	(ESC j)
↓	T	F/T	F	LF
↓ with Shift	T	F/T	F	LF
←	T	F/T	F	BS
→	T	F/T	F	FF
Answr	F	F	F	ENQ
← Backspace	T	F/T	F	BS
CE				
Char Delete	(F)	(F)	(F)	(ESC W)
Char Insert	(F)	(F)	(F)	(ESC Q)
Clear				
Clear with Shift	F	F	F	SUB
Enter	T	F/T	F	CR
Home	T	F/T	F	RS
Line Delete	(F)	(F)	(F)	(ESC R)
Line Erase	F	F	F	ESC T
Line Erase with Shift				
Line Insert	(F)	(F)	(F)	(ESC E)
Page Erase	F	F	F	ESC Y
Page Erase with Shift				
Print	(F)	(F)	(F)	(ESC P)
Send	(F)	(F)	(F)	(ESC 7)
Send with Shift				
Tab →	T	T	(F)	HT
← Tab	(F)	(F)	(F)	(ESC I)

Figure E-5. AID Codes in ADM 5 Mode

Key	Echo Mode	Char Mode	Block Mode	AID Code
↑	T	F/T	F	SUB
↑ with Shift	(T)	(F/T)	(F)	(ESC j)
↓	T	F/T	F	LF
↓ with Shift	T	F/T	F	LF
←	T	F/T	F	NAK
→	T	F/T	F	ACK
Answr	T	F/T	F	ENQ
← Backspace	T	F/T	F	BS
CE				
Char Delete	(T)	(F/T)	(F)	(ESC W)
Char Insert	(T)	(F/T)	(F)	(ESC Q)
Clear	T	F/T	F	FF
Clear with Shift				
Enter	T	F/T	F	CR
Home	T	F/T	F	SOH
Line Delete	(T)	(F/T)	(F)	(ESC R)
Line Erase	T	F/T	F	ESC K
Line Erase with Shift				
Line Insert	(T)	(F/T)	(F)	(ESC E)
Page Erase	T	F/T	F	ESC k
Page Erase with Shift				
Print	(F)	(F)	(F)	(ESC P)
Send	(T)	(F/T)	(F)	(ESC 7)
Send with Shift				
Tab →	T	T	(F)	HT
← Tab	(T)	(F/T)	(F)	(ESC I)

Figure E-6. AID Codes in ADDS VP A2 Mode

Key	Echo Mode	Char Mode	Block Mode	AID Code
↑	T	F	F	~ FF
↑ with Shift	(T)	(F)	(F)	(~ j)
↓	T	F	F	~ VT
↓ with Shift	T	F/T	F	LF
←	T	F/T	F	BS
→	T	F	F	DLE
Answr				
← Backspace	T	F/T	F	BS
CE				
Char Delete	(T)	(F)	(F)	(~ W)
Char Insert	(T)	(F)	(F)	(~ Q)
Clear	T	F	F	~ FS
Clear with Shift	T	F	F	~ GS
Enter	T	F/T	F	CR
Home	T	F	F	~ DC2
Line Delete	T	F	F	~ DC3
Line Erase	T	F	F	~ FF
Line Erase with Shift				
Line Insert	T	F	F	~ SUB
Page Erase	T	F	F	~ CAN
Page Erase with Shift				
Print	(F)	(F)	(F)	(~ P)
Send	(T)	(F)	(F)	(~ 7)
Send with Shift				
Tab →	T	F/T	F	HT
← Tab				

Figure E-7. AID Codes in HZ 1500 Mode

†: When in Duplex Edit
††: When in Local Edit
†††: Same as Duplex Edit

Key	Echo† Mode	Char† Mode	Block† Mode	All†† Modes	AID Code
↑	T	F/T	F	F	VT
↑ with Shift	(T)	(F/T)	(F)	(F)	(ESC j)
↓	T	F/T	F	F	SYN
↓ with Shift	T	F/T	F	F	LF
←	T	F/T	F	F	BS
→	T	F/T	F	F	FF
Answr					
← Backspace	T	F/T	F	F	BS
CE	(T)	(F/T)	(F)	(F)	(CAN)
Char Delete	T	F/T	F	F	ESC W
Char Insert	T	F/T	F	F	ESC Q
Clear	T	F/T	F	F	SUB
Clear with Shift	T	F/T	F	F	ESC *
Enter	T	F/T	F	†††	CR
Home	T	F/T	F	F	RS
Line Delete	T	F/T	F	F	ESC R
Line Erase	T	F/T	F	F	ESC T
Line Erase with Shift	T	F/T	F	F	ESC t
Line Insert	T	F/T	F	F	ESC E
Page Erase	T	F/T	F	F	ESC Y
Page Erase with Shift	T	F/T	F	F	ESC y
Print	(T)	(F/T)	(F)	(F)	(ESC P)
Send	T	F/T	F	F	ESC 7
Send with Shift	T	F/T	F	F	ESC 6
Tab →	T	F/T	F	F	HT
← Tab	T	F/T	F	F	ESC I

Figure E-8. AID Codes in TVI910/910+ Mode

†: When in Duplex Edit
††: When in Local Edit
†††: Same as Duplex Edit

Key	Echo† Mode	Char† Mode	Block† Mode	All†† Modes	AID Code
↑	T	F/T	F	F	VT
↑ with Shift	T	F/T	F	F	ESC j
↓	T	F/T	F	F	SYN
↓ with Shift	T	F/T	F	F	LF
←	T	F/T	F	F	BS
→	T	F/T	F	F	FF
Answr					
← Backspace	T	F/T	F	F	BS
CE	T	F/T	F	F	CAN
Char Delete	T	F/T	F	F	ESC W
Char Insert	T	F/T	F	F	ESC Q
Clear	T	F/T	F	F	SUB
Clear with Shift	T	F/T	F	F	ESC *
Enter	T	F/T	F	†††	CR
Home	T	F/T	F	F	RS
Line Delete	T	F/T	F	F	ESC R
Line Erase	T	F/T	F	F	ESC T
Line Erase with Shift	T	F/T	F	F	ESC t
Line Insert	T	F/T	F	F	ESC E
Page Erase	T	F/T	F	F	ESC Y
Page Erase with Shift	T	F/T	F	F	ESC y
Print	T	F/T	F	F	ESC P
Send	T	F/T	F	F	ESC 7
Send with Shift	T	F/T	F	F	ESC 6
Tab →	T	F/T	F	F	HT
← Tab	T	F/T	F	F	ESC I

Figure E-9. AID Codes in TVI925/925E Mode

†: When in Duplex Edit or Not Enhance Mode
††: When in Local Edit and Enhance Mode

Key	Echo† Mode	Char† Mode	Block† Mode	Other†† Mode	AID Code
↑	T	F/T	F	F/T	VT
↑ with Shift					
↓	T	F/T	F	F/T	LF
↓ with Shift	T	F/T	F	F/T	LF
←	T	F/T	F	F/T	BS
→	T	F/T	F	F/T	FF
Answr					
← Backspace	T	F/T	F	F/T	BS
CE					
Char Delete	F (T)	F (F/T)	F	F	ESC W
Char Insert	F (T)	F (F/T)	F	F	ESC Q
Clear	F (T)	F (F/T)	F	F	SUB
Clear with Shift	F/T	F/T	F	F/T	SUB
Enter	T	F/T	F	F/T	CR
Home	T	F/T	F	F/T	RS
Line Delete	F (T)	F (F/T)	F	F	ESC R
Line Erase	F (T)	F (F/T)	F	F	ESC T
Line Erase with Shift	F (T)	F (F/T)	F	F	ESC t
Line Insert	F (T)	F (F/T)	F	F	ESC E
Page Erase	F (T)	F (F/T)	F	F	ESC Y
Page Erase with Shift	F (T)	F (F/T)	F	F	ESC y
Print	F (T)	F (F/T)	F	F	ESC P
Send	F (T)	F (F/T)	F	F	ESC 7
Send with Shift	F (T)	F (F/T)	F	F	ESC 6
Tab →	T	F/T	F	F/T	HT
← Tab	F (T)	F (F/T)	F	F	ESC I

Figure E-10. AID Codes in TVI912/920 Mode

Appendix F. Supplemental Information for National Language Machines

This appendix provides the supplemental information for national language machines.

The national language machines consist of a video element, a keyboard, a stand (accessory), and a cartridge, which is inserted into the cartridge slot located at the back of the video element. The national language machines provide the same functions as the U.S. English machine except the ten-ASCII-terminal emulations.

Note: Some national language machines do not provide the IBM 3101 emulation.

The national language machines use different character sets from the U.S. English machine. Messages and menus are also translated into the national languages for some national language machines.

Note: IBM marketing representatives will supply information about the models that are available in each country.

Contents

Additional Setup Parameter and Value

Additional Setup Parameter and Value

Note: This function is not supported for some languages.

The Characters parameter is added in the GENERAL menu. The Characters parameter specifies whether you use the *national language* or *multinational language* code page. The Characters parameter in the GENERAL menu is not supported by the command.

IBM 4201/4202 can also be selected for the Characters parameter in the KEYBOARD/PRINTER menu. When IBM 4201/4202 is selected and the Word Length parameter is 8, the 3151 can send all characters on the screen to the IBM 4201 or IBM 4202. The Set/Read Control 7 commands and response (see "Set/Read Control 7 Commands/Response" on page 6-33) assign B'01' for bits 2 and 1 of `pa2` to IBM 4201/4202.

Character Sets for Other Than the U.S. English

National language machines can use the special graphics character set (see Figure 2-6 on page 2-16) and either of the following:

- National language character sets
- Multinational language character sets.

The national language character sets include:

- Character set 1.

  This character set conforms to the ISO 646. It corresponds to the U.S. ASCII character set (7 bit) for the U.S. English machine and is unique to each country.

- Character set 2.

  This character set contains the characters that are unique to each country.

The multinational language character sets are equivalent to the ISO 8859 standard.

You can select the character sets from the GENERAL menu. When NATIONAL for the Characters is selected, the national language character sets are used. When MULTINATIONAL for the Characters is selected, the multinational language character sets are used.

Note: The national language character sets are not supported for some languages.

Character Sets for Other Than the U.S. English

Multinational Language Character Sets (ISO 8859)

Figure F-1 shows the code pages for the multinational language character sets.

Bits				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1	Hex 0 / Hex 1	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENG	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	A	LF	SUB	*	:	J	Z	j	z
1	0	1	1	B	VT	ESC	+	;	K	[	k	{
1	1	0	0	C	FF	FS	,	<	L	\	l	|
1	1	0	1	D	CR	GS	-	=	M	]	m	}
1	1	1	0	E	SO	RS	.	>	N	^	n	~
1	1	1	1	F	SI	US	/	?	O	_	o	DEL

Figure F-1 (Part 1 of 2). Code Pages for Multinational Language Character Set (ISO 8859)

Character Sets for Other Than the U.S. English

Bits				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1	Hex 0 / Hex 1	0	1	2	3	4	5	6	7
0	0	0	0	0			NBSP	°	À	Ð	à	ð
0	0	0	1	1			¡	±	Á	Ñ	á	ñ
0	0	1	0	2			¢	²	Â	Ò	â	ò
0	0	1	1	3			£	³	Ã	Ó	ã	ó
0	1	0	0	4			⌾	´	Ä	Ô	ä	ô
0	1	0	1	5			¥	µ	Å	Õ	å	õ
0	1	1	0	6			¦	¶	Æ	Ö	æ	ö
0	1	1	1	7			§	·	Ç	×	ç	÷
1	0	0	0	8			¨	¸	È	Ø	è	ø
1	0	0	1	9			©	¹	É	Ù	é	ù
1	0	1	0	A			ª	º	Ê	Ú	ê	ú
1	0	1	1	B			«	»	Ë	Û	ë	û
1	1	0	0	C			¬	¼	Ì	Ü	ì	ü
1	1	0	1	D			SHY	½	Í	Ý	í	ý
1	1	1	0	E			®	¾	Î	Þ	î	Þ
1	1	1	1	F			¯	¿	Ï	ß	ï	ÿ

Figure F-1 (Part 2 of 2). Code Pages for Multinational Language Character Set (ISO 8859)

Legend:

NBSP: No-break space
SHY: Soft hyphen

Character Sets for Other Than the U.S. English

Selecting a Character Set

When power is turned on, the character sets are assigned to the G0, G1, and the C0 spaces as follows:

- When the Characters parameter is NATIONAL:
  - ASCII control characters (X'00' through X'20' and X'7F' in character set 1) are assigned to the C0 space.
  - ASCII graphic characters (X'21' through X'7E' in character set 1) are assigned to the G0 space.
  - ASCII graphic characters (X'21' through X'7E' in character set 2) are assigned to the G1 space.
- When the Characters parameter is MULTINATIONAL:
  - ASCII control characters (X'00' through X'20' and X'7F' in Figure F-1 on page F-4) are assigned to the C0 space.
  - ASCII graphic characters (X'21' through X'7E' in the U.S. ASCII graphic character set) are assigned to the G0 space.
  - Multinational language characters (X'20' through X'7F' in Figure F-1 on page F-5) are assigned to the G1 space.

Character Sets for Other Than the U.S. English

From the Host System

Application programs can use the Select Character Set G0/G1 commands to assign the selected character set to the G0 or the G1 space. The following shows the format and possible parameter values for the Select Character Set G0/G1 command.

Format

- Select Character Set G0

  ESC < pa

- Select Character Set G1

  ESC > pa

Parameter

pa:

Content	Description
@	Character set 1 (Characters parameter is NATIONAL) or U.S. ASCII (Characters parameter is MULTINATIONAL)
A	Special graphics (superscripts, subscripts, and line-drawing)
B	Character set 2 (Characters parameter is NATIONAL) or Special characters in an ISO 8859 standard (Characters parameter is MULTINATIONAL)

Note: B for parameter pa can only be specified for national language machines.

Character Sets for Other Than the U.S. English

After the character sets have been assigned to the G0 and G1 spaces, the spaces can be accessed as follows:

- When the Word Length parameter is 7-bit; ASCII control characters (SI and SO) are used to select the G0 and G1 spaces, respectively.

- When the Word Length parameter is 8-bit; the most significant bit (MSB), which is bit 8, is used to select the G0 and G1 spaces. If MSB is set to B'1', G1 is selected; If MSB is set to B'0', G0 is selected. SI and SO are ignored in both cases.

Note: In 7-bit mode operation, one byte (SI or SO) is used to change a character set, however, in 8-bit mode, the MSB (one bit) can do the same thing. This is the only difference between the 8-bit and 7-bit modes of operation in the 3151.

From the Keyboard

The 3151 places the Select Character Set G0/G1 response, and/or the SI or SO character (in 7-bit mode) in front of the character that is entered from the keyboard before sending the character to the host system, if changing the character set or changing the space to be used is needed.

For example, when the Characters parameter is NATIONAL, the national language character set 1 (similar to the U.S. ASCII character set) is assigned to the G0 space, the national language character set 2 is assigned to the G1 space (default assignment). When you enter a line-drawing symbol following the alphanumeric character, the 3151 places the Select Character Set G1 response (ESC > A) followed by the SO before the line-drawing symbol.

Description: The 3151 replaces the current space (in this case, the G1 for the national language character set 2) with the required character set (in this case, the special graphic character set) and generates the Select Character Set G1 response (ESC > B) when any character in the national language character set 2 is entered again.

Additional Keyboard Functions

In addition to the 3151 standard keyboard functions (U.S. keyboard functions), additional functions are provided for each keyboard to enter the characters printed on the right half of the key tops (some are not printed).

AltGr (Alternate Graphic) Key

This key is used to enter the country's unique characters that are on the right half of some keys on the keyboard. To get the lower right half of the key, press the key while holding down the *AltGr* key (or press the key after pressing the *AltGr* key). To get the upper right half of the key, press the key while holding down the *AltGr* and *Shift* keys (or press the key while holding down the *Shift* key after pressing the *AltGr* key).

One of the following messages may appear during the operation.

Message	Description
ALT GR	Appears when the *AltGr* key is pressed; you can enter the character located on the right half of the key.
CAPS ALT GR	Appears when the *AltGr* key is pressed in the caps-lock mode.
UP ALT GR	Appears when the *AltGr* key is pressed in the up-shift mode.

Note: CAPS and CAPS ALT GR do not appear in the operator information area for some languages.

Diacritical Mark Keys

Diacritical characters can be generated by using a diacritical (accent) mark key if the diacritical characters exist in the code page that is being used. Some diacritical marks are not indicated on the keys but exist on the right half of the selected keys. Diacritical marks are indicated by the square box around the mark in the keyboard illustrations.

Diacritical marks include:

- Acute accent (′)
- Cedilla (¸)
- Circumflex (^)
- Diaeresis (¨)
- Grave accent (`)
- Over-circle (°)
- Tilde (~).

How to Create Diacritical Characters

Step 1. Press one of the diacritical mark keys.

The diacritical mark is not displayed nor sent to the host system.

Note: If you then press the *Space Bar* or the same diacritical mark key at this point, the diacritical mark is displayed, sent, or displayed and sent.

Step 2. Press an alphabetic key that can form a correct diacritical character with the previously entered diacritical mark.

The diacritical character is displayed, sent, or displayed and sent.

Note: If you press the incorrect alphabetic key, the audible alarm sounds and the operation is terminated.

During this operation, COMPOSE (may be translated into each national language) may appear in the operator information area.

Information on Each National Language

Canadian French

The Canadian French machine supports the functions explained in the previous sections as follows: (In the figure, 'yes' means the function is provided.)

IBM 3101 emulation	yes
Characters parameter in the GENERAL menu	yes
IBM 4201/4202 selection for the Characters parameter in the KEYBOARD/PRINTER menu	yes
Translation of messages and menus	yes
National language character sets	yes
Multinational language character sets	yes
AltGr key	yes
Creation of diacritical characters	yes

Figure F-2. Functions in Canadian French Machine

The label for the *AltGr* key is replaced with *AltCar*.

Canadian French

National Language Character Sets

Note: Canadian French character set 1 is the same as the U.S. ASCII character set.

Bits				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1	Hex 0 / Hex 1	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	A	LF	SUB	*	:	J	Z	j	z
1	0	1	1	B	VT	ESC	+	;	K	[	k	{
1	1	0	0	C	FF	FS	,	<	L	\	l	|
1	1	0	1	D	CR	GS	-	=	M	]	m	}
1	1	1	0	E	SO	RS	.	>	N	^	n	~
1	1	1	1	F	SI	US	/	?	O	_	o	DEL

Figure F-3. Code Page for Canadian French Character Set 1

Bits				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1	Hex 0 / Hex 1	0	1	2	3	4	5	6	7
0	0	0	0	0				°	À		à	
0	0	0	1	1								
0	0	1	0	2					Â		â	
0	0	1	1	3								
0	1	0	0	4				´		Ô		ô
0	1	0	1	5								
0	1	1	0	6								
0	1	1	1	7					Ç		ç	
1	0	0	0	8			¨	¸	È		è	
1	0	0	1	9					É	Ù	é	ù
1	0	1	0	A					Ê		ê	
1	0	1	1	B					Ë	Û	ë	û
1	1	0	0	C						Ü		ü
1	1	0	1	D								
1	1	1	0	E					Î		î	
1	1	1	1	F					Ï		ï	

Figure F-4. Code Page for Canadian French Character Set 2

Canadian French

Keyboard Layouts

Figure F-5 and Figure F-6 on page F-15 shows the actual labels on the keyboards and Figure F-7 on page F-15 shows the ASCII control character positions and non-indicated characters. Diacritical marks are indicated by the square box around the mark in the keyboard illustrations.

Notes:

1. *When using the national language code page (Characters parameter in the GENERAL menu is NATIONAL), characters that exist on the keyboard but are not contained in the national language character sets (character sets 1 and 2) or special graphics character set cannot be entered or displayed.*

2. *When using the national language code page, non-indicated characters that are contained in the national language character sets (character sets 1 and 2) or special graphics character set can be entered or displayed.*

3. *When using the multinational language code page, all characters on the keyboard (including non-indicated characters) can be entered or displayed.*

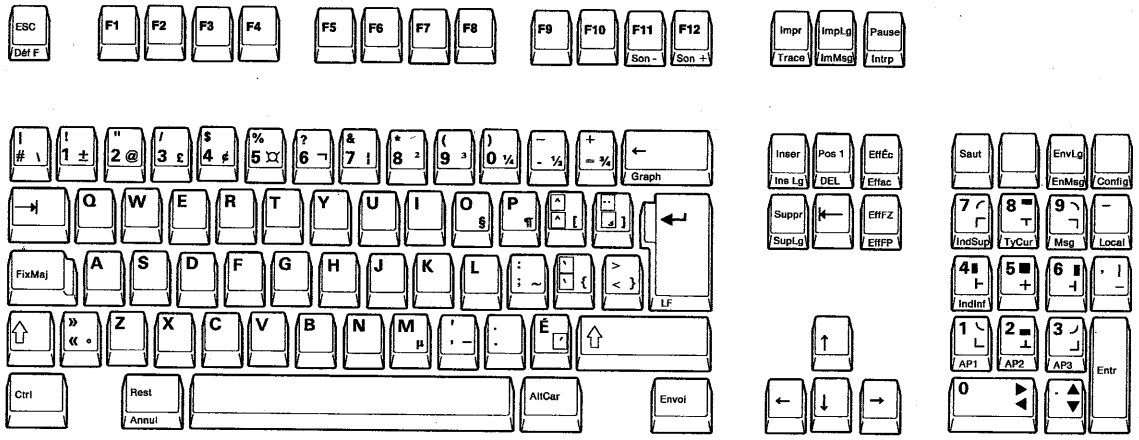


Figure F-5. Canadian French Keyboard with Numeric Keypad

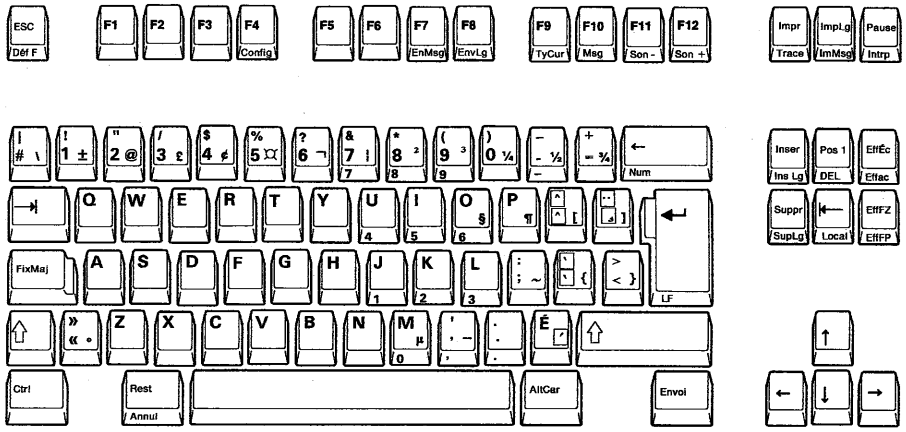


Figure F-6. Canadian French Keyboard without Numeric Keypad

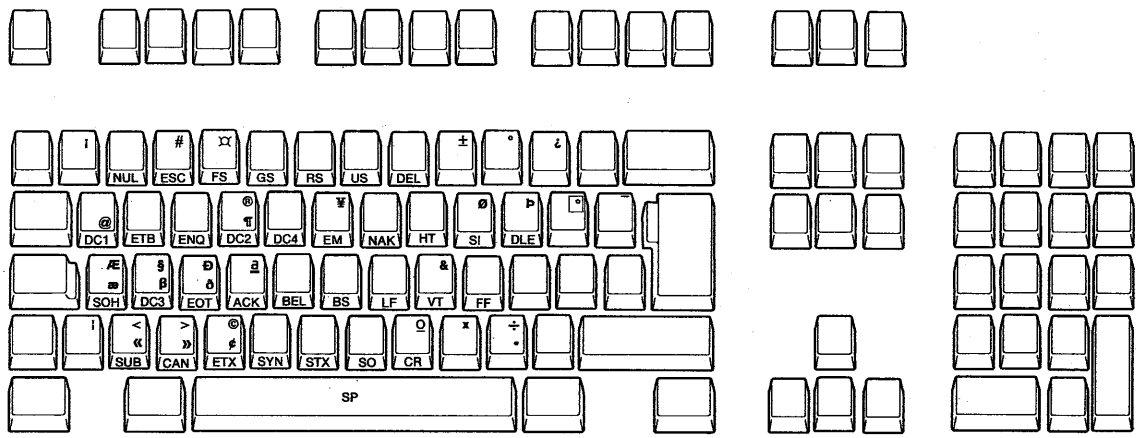


Figure F-7. Canadian French Keyboard with ASCII Control Characters and Non-indicated Characters

Canadian French

GENERAL

Mode machine	IBM 3151* | IBM 3101
Type affichage	NORMAL* | VIDEO INV.
Lignes x colonnes	24 x 80* | 25 x 80 | 24 x 132 | 25 x 132
Défil. écran	PAR SAUT* | REGUL.(RAPIDE) | REGUL.(LENT) | NON
LF auto.	OUI* | NON
Protection tube	NON* | OUI
Retour marge auto.	OUI* | NON
Inser. autorisée	NON* | LIGNE | CAR. | LIGNE/CAR.
Tabulation	CHAMP* | COLONNE
Caractères	NATIONAUX* | INTERNAT.
ID term. (up to 20 characters)	_____

TRANSMISSIONS

Mode d'utilisation	BLOCS* | ECHO | CAR.
Vitesse de ligne (bps)	50 | 75 | 110 | 134.5 | 150 | 200 | 300 | 600 | 1200 | 1800 | 2400 | 3600 | 4800 | 9600* | 19200 | 38400
Longueur caract. (bits)	7* | 8
Bit de parité	IMPAIR* | PAIR | NON | Forcé à 0 | Forcé à 1
Bit d'arrêt	1* | 2
Car. de retournement	ETX* | CR | EOT | DC3
Contrôle de ligne	PRTS* | IPRTS | CRTS
Signal Intrp (ms)	500* | 170
Suppr. envoi nuls	OUI* | NON
Régulation**	NON* | OUI

CLAVIER/IMPRIMANTE

Entrée	RETOUR* | ENVOI
Retour	CHAMP* | LIGNE SUIV.
Ligne suivante	CR* | CR/LF
Envoi	PAGE* | LIGNE
Caract. inséré	CLAV.* | ESPACE
Vitesse ligne (bps)	50 | 75 | 110 | 134.5 | 150 | 200| 300 | 600 | 1200 | 1800 | 2400 | 3600 | 4800 | 9600* | 19200
Longueur caract. (bits)	7* | 8
Bit de parité	IMPAIR* | PAIR | NON | Forcé à 0 | Forcé à 1
Bit d'arrêt	1* | 2
Caractères	NATIONAUX* |IBM 4201/4202| TOUS

* Indicates the default values (same values as set in the factory).
** The **Pacing** parameter applies only to IBM 3101 emulation mode; it is always set to on in 3151 mode.

Figure F-8. Setup Parameters List for Canadian French

Glossary

This glossary defines terms and abbreviations that are used in this guide. It also includes terms and definitions from *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, GC20-1699, as well as developed by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO). This material is reproduced in part from the *American National Dictionary for Information Processing*, Copyright 1977, by the Computer and Business Equipment Manufactures Association, copies of which may be purchased from the American National Standards Institute, 1430 Broadway, New York, NY 10018. Definitions from published sections of *ISO Vocabulary of Data Processing* are identified by the symbol "(ISO)" preceding the definition.

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A

active page. A page in which the cursor is located.

active partition. An area in which the cursor is located and an operator can access. Contrast with host partition.

AID. Attention identification

application program. A program written for or by a user that applies to the user's work.

*** ASCII.** American National Standard Code for Information Interchange. The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

ASCII control characters. Deprecated term for American National Standard control characters.

asynchronous. Without regular time relationship; unexpected or unpredictable with respect to the execution of a program's instructions.

Glossary

attention identification (AID). A code that is sent to the host system when the selected key is pressed. An AID is unique to the key.

attribute. See display attribute.

audible alarm. An alarm that is activated when predetermined events occur that require operator attention or intervention for system operation.

AUX. Auxiliary.

auxiliary port. A port that is used to communicate with the optional device (such as a printer).

B

binary digit. (1) * (ISO) In binary notation, either of the characters 0 or 1. (2) Synonymous with bit.

bit. Synonym for binary digit.

block mode. A method of transmitting data in groups of bits or characters as a unit (block). See also character mode and echo mode.

bps. Bits per second. In serial transmission, the instantaneous bit speed with which a device or channel transmits a character.

BS. Backspace.

buffer. (1) * A routine or storage used to compensate for a difference in the rate of flow of data, or time of occurrence of events, when transferring data from one device to another. (2) A portion of storage for temporarily holding input or output data.

byte. (1) * A binary character operated upon as a unit and usually shorter than a computer word. (2) The representation of a character.

C

CA. Character attribute.

CAN. Cancel.

cartridge. An element that stores the program to operate the IBM 3151, for example, in emulation mode.

CBX. Computerized branch exchange

CCITT. International Telegraph and Telephone Consultative Committee

CD. Carrier detect.

character. A language unit composed of bits, for example, a letter, number, or special symbol, such as an asterisk or question mark.

character mode. A method of transmitting data one character at a time, rather than by blocks and at the same time displaying it on the screen. See also block mode and echo mode.

character set. A defined collection of characters selected by the Select Character Set G0/G1 commands.

column tab. A function that advances the cursor to the next tab stop set by the Set Column Tab command.

command. See host command.

COMMUNICATION menu. One of the setup menus that is used to define the 3151 setup parameters concerning the communications with the host system.

contention. (1) (TC97) A condition arising when two or more data stations attempt to transmit at the same time over a shared channel, or when two data stations attempt to transmit at the same time in two-way alternate communication. (2) A line-control scheme in which stations on a line compete for the use of that unused line; the station that is successful in gaining control of the line is able to transmit.

CR. Carriage return.

CRT. Cathode ray tube.

CRTS. Controlled request to send.

CTS. Clear to send.

current field. A field in which the cursor is located.

current line. For the operator, a line on which the cursor is located. For the host system, a current line is defined by the current cursor address (when in cursor address mode) or buffer address (when in buffer address mode).

cursor. (1) (TC97) In computer graphics, a movable marker that is used to indicate a position on a display surface. (2) (TC95) A displayed symbol that acts as a marker to help the user locate a point in text, in a system command, or in storage. (3) A movable spot of light on the screen of the display device, usually indicating where the next character will be entered, replaced, or deleted.

D

data. Information that is digital in form when processed by a computer.

data stream. All data transmitted through a communication line in a single operation.

DC1. Device control 1.

DC2. Device control 2.

DC3. Device control 3.

DC4. Device control 4.

default. An alternative value, attribute, or option that is assumed when none has been specified.

display attribute. (TC97) In computer graphics, a particular property that is assigned to all or part of a display; for example, low intensity, green color, blinking status.

DEL. Delete.

DLE. Data link escape.

DLE sequence. A character string that begins with the DLE character.

DSR. Data set ready.

DTR. Data terminal ready.

E

echo mode. A method of transmitting data one character at a time, rather than by blocks. The host system then returns data for display on the screen. See also block mode and character mode.

EIA. Electronic Industry Association

EIA RS-232C. An Electronic Industry Association (EIA) communications interface standard.

EIA RS-422A. An Electronic Industry Association (EIA) communications interface standard.

emulation. (1) (TC97) The imitation of all or part of one computer system by another, primarily by hardware, so that the imitating computer system accepts the same data, executes the same programs, and achieves the same results as the imitated computer system. (2) The use of programming techniques and special machine features to permit a computing system to execute programs written for another system.

EOF. End of field.

EOL. End of line.

EOP. End of page.

EOT. End of transmission.

ESC (escape) sequence. A character string that begins with the ESC character. See also host command.

ETX. End of text.

F

FA. Field attribute

FF. Form feed.

field. An area that consists of a field attribute and the data following it. See also field attribute.

field attribute. A control character stored in the character buffer in the first character position of a field. A field attribute defines the characteristics (such as high-intensity and blinking) of the field.

field tab. A function that advances the cursor to the first character position of the next unprotected field, if it exists.

formatted page. A page in which one or more fields have been defined by an application program. Contrast with unformatted page.

full duplex. A method of transmission in which both stations can receive and transmit simultaneously.

function key. See program function key.

FUNCTION menu. One of the setup menus that is used, for example, to save the definitions that are made on the other menus.

G

GENERAL menu. One of the setup menus that is used to define the 3151 setup parameters (such as machine mode and terminal ID).

H

half duplex. A method of transmission in which signals can go in both directions, but in only one direction at any given time.

home position. A first unprotected character position in a screen or partition.

host command. A character string that is sent from the host system or entered from the keyboard to control the terminal's functions. Contrast with response.

host message. A message defined by an application program and displayed in the bottom of the screen using the message (Msg) key.

host partition. An area which an application program writes or reads data. Contrast with active partition.

host system. (1) A data processing system that is used to prepare programs and the operating environments for use on another computer or controller. (2) The data processing system to which a network is connected and with which the system can communicate.

HT. Horizontal tab.

I

IBM marketing representative. The person who represents IBM and who takes your order.

IBM service representative. An individual who provides field service for IBM products (for example, field maintenance of IBM hardware).

inbound pacing. A process for controlling the flow of data from the terminal to the host system (or from the optional device to the terminal). Contrast with outbound pacing.

inbound pass-through. An operation that passes data from the optional device to the host system. Contrast with outbound pass-through.

interface. A shared boundary defined by functional characteristics, common physical interconnection characteristics, signal characteristics, and other characteristics, as appropriate.

IPRTS. Induced permanent request to send.

*** ISO.** International Organization for Standardization.

K

KEYBOARD/PRINTER menu. One of the setup menus that is used to define the 3151 setup parameters concerning the keyboard operations and the communications with the optional device on the auxiliary port.

L

LF. Line feed.

line-drawing symbols. The symbols that are on the right half of the numeric keypad keys. They are used for drawing lines and making tables.

line speed. The transmission speed of digital signals, usually calculated in bits per second. Also called baud rate.

local mode. A mode in which communications with the host system are disabled.

LSB. Least significant bit.

LTA. Line turnaround character.

M

main port. A port that is used to communicate with the host system.

MDT. Modified data tag.

modem. (1) * (modulator-demodulator) A device that modulates and demodulates signals transmitted over data communication facilities. (2) (TC97) A functional unit that modulates and demodulates signals. One of the functions of a modem is to enable digital data to be transmitted over analog transmission facilities.

MSB. Most significant bit.

N

nonswitched line. A telecommunication line on which connections do not have to be established by dialing. Contrast with switched line.

null character (NUL). (ISO) A control character that is used to accomplish media-fill or time-fill, and that may be inserted into or removed from, a sequence of characters without affecting the meaning of the sequence; however, the control of equipment or the format may be affected by this character.

null line. A line that contains only null characters.

numeric keypad. A set of keys, located at the right side of the keyboard, that can be used to enter numbers and line-drawing symbols.

NVM. Non-volatile memory.

O

OIA. Operator information area.

online. Pertaining to a user's access to a computer via a terminal or to terminal equipment connected to a transmission line in direct communication action over the line with another terminal or with a computer.

operator information area. The screen area on the bottom line of the screen where messages are displayed to define the status of the terminal or system to the operator.

operator message. A message, displayed in the operator information area, that informs an operator of the operating status of the 3151.

optional device. A device that is connected to the auxiliary port.

outbound pacing. A process for controlling the flow of data from the host system to the terminal (or from the terminal to the optional device). Contrast with inbound pacing.

outbound pass-through. An operation that passes data from the host system to the terminal. Contrast with inbound pass-through.

P

pacing. A technique by which a receiving station controls the rate of transmission of a sending station to prevent overrun.

page. * A block of data. The 3151 allows only one page to be contained in each partition, therefore, a partition and a page represent the same thing. See partition.

parameter. (1) * (ISO) A variable that is given a constant value for a specified application and that may denote the application. (2) A variable that is given a constant value for a specific document program instruction.

partition. All or a portion of the screen area of a display space and its buffer. Data is presented within the partition through a viewport that is defined when the partition is created. Each viewport has an independent partition.

printer. A device that writes output data from a system on paper or other media.

program. A set of actions or instructions that a machine is capable of interpreting and executing.

program access (PA) key. A key on the keyboard of a display device that produces an interruption to solicit program action.

program function (F1 -F24) key. A key on the keyboard of a display device that passes a signal to a program to call for a particular program operation.

protected field. On a display device, a display field in which the user cannot enter, modify, or erase data from the keyboard. Contrast with unprotected field.

protocol. (TC97) The set of rules governing the operation of functional units of a communication system that must be followed if communication is to be achieved.

PRTS. Permanent request to send.

R

response. A character string that is sent from the terminal to the host system in response to a command or when one of the selected keys is pressed. Contrast with command.

reverse video. A means of highlighting a character or a field by reversing the light intensity between the character and its background; for example, changing a normally black-on-white character to a white-on-black character.

RD. Received data.

RLSD. Received line signal detector. Also called CD (carrier detect).

ROS. Read only storage.

RTS. Request to send.

S

screen format. A format that defines the number of rows and columns of the display screen. The 3151 provides four screen formats: 24 (row) x 80 (column), 24 x 132, 25 x 80, and 25 x 132.

scroll. To move vertically a partition in such a manner that new data appears at one edge as old data disappears at the opposite edge of the viewport.

send mark. A mark, defined by an application program or an operator, that specifies the data area to be sent to the host system or the optional device.

setup menu. A menu that is displayed on the screen and is used to define the 3151 setup parameters. Setup menus include GENERAL, COMMUNICATION, KEYBOARD/PRINTER, and FUNCTION menus. See also setup parameter.

setup parameter. A variable that should be defined to customize the 3151 before operating it. See also setup menu.

setup value. See setup parameter.

SI. Shift in.

SO. Shift out.

STX. Start of text.

SUB. Substitute.

switched line. A telecommunication line in which the connection is established by dialing. Contrast with nonswitched line.

system programmer. (1) A programmer who plans, generates, maintains, extends, and controls the use of an operating system with the aim of improving the overall productivity of an installation. (2) A programmer who designs programming systems and other applications.

T

TD. Transmission data.

***terminal.** (1) A point in a system or network at which data can either enter or leave. (2) A device, usually equipped with a keyboard and a display device, capable of sending and receiving information over a link.

test mode. A mode in which the internal circuits are checked and the test pattern is displayed. This mode is started by pressing the *Hold* key while holding down the *Ctrl* and *Shift* keys.

transmission. (1) The sending of data from one place for reception elsewhere. (2) (TC97) The dispatching of a signal, message, or other form of intelligence by wire, radio, telegraphy, telephony, facsimile, or other means.

trace mode. A mode in which data from the host system is transferred to the optional device without data conversion while displaying the same data on the screen.

transparent mode. A mode in which host commands are handled as character strings.

U

unformatted page. A page in which no field has been defined by an application program. Contrast with formatted page.

unprotected field. On a display device, a display field in which the user can enter, modify, or erase data from the keyboard. Contrast with protected field.

V

viewport. A rectangular area on the usable area of the display surface through which the operator views all or portion of the data. The 3151 can have up to three viewports.

VM. Volatile memory.

VT. Vertical tab.

X

XOFF. Transmitter off.

XON. Transmitter on.

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