Systems

IBM 3178 Display Station
Description

IBM

Systems

IBM 3178 Display Station Description

IBM

Federal Communications Commission (FCC) Statement

Warning: This equipment generates, uses, and can radiate radio frequency
energy and, if not installed and used in accordance with the instructions
manual, may cause interference to radio communications. It has been
tested and found to comply with the limits for a Class A computing device
pursuant to Subpart J of Part 15 of FCC Rules, which are designed to
provide reasonable protection against such interference when operated in a
commercial environment. Operation of this equipment in a residential area
is likely to cause interference, in which case the user, at his own expense,
will be required to take whatever measures may be required to correct
the interference.

The above FCC statement applies only to those machines used in the U.S.

Preface

This publication describes the IBM 3178 Display Station when it is attached to the IBM 3274 Control Unit, to the IBM 3276 Control Unit Display Station, or to the IBM 4321/4331 Processor with the Display/Printer Adapter.

This publication is intended as a reference for the following customer personnel:

- System analysts who are responsible for designing and coordinating the total system of which the IBM 3178 will be a part

- System programmers who generate and update the host operating system and the programming associated with it

- Site planners who prepare the site for the setup of IBM 3178s

- Persons who are responsible for setting up and relocating the IBM 3178s

The reader is assumed to be familiar with the IBM 4331 Processor or IBM 3270 Information Display System.

The IBM 3178 provides the same basic functions as the IBM 3278 Model 2 Display Station in the same environment.

Organization of This Manual

This manual has five chapters:

Chapter 1, "Introduction," gives a general description of the IBM 3178 Display Station, including the differences from the IBM 3278 Model 2 Display Station.

Chapter 2, "Physical Description," gives dimensions of the IBM 3178.

Chapter 3, "Functional Description," provides a comprehensive description of what the IBM 3178 does.

Chapter 4, "Operation," describes the operation of the IBM 3178 when it is attached to the IBM 4331 Processor or to the IBM 3274 Control Unit or IBM 3276 Control Unit Display Station.

Chapter 5, "Programming Support," gives reference information about host programming support and subsystems of the IBM 4300 Processor and of the IBM 3270 Information Display System.

The manual also has the following six appendixes and a glossary of terms and abbreviations:

Appendix A, "Installation Planning"
Appendix B, "Lightning Protection"
Appendix C, "Physical Planning Template"
Appendix D, "U.S. EBCDIC I/O Interface Codes"
Appendix E, "Information for Europe, the Middle East, and Africa"
Appendix F, "Information for the Americas and Far Eastern Countries"
Glossary of Terms and Abbreviations

Related Publications

The following publications supplement the information contained in this publication:

- *IBM 3178 Display Station Operator Reference Guide*, GA18-2128

- *IBM 3270 Information Display System: 3274 Control Unit Description and Programmer's Guide*, GA23-0061

- *IBM 3270 Information Display System: 3276 Control Unit Display Station Description and Programmer's Guide*, GA18-2081

- *IBM 4331 Processor Display/Printer Adapter Component Description*, GA33-1536

- *Installation Assembly of Coaxial Cable and Accessories for Attachment to IBM Products*, GA27-2805

Reference Publications

The following are reference publications:

- *An Introduction to the 3270 Information Display System*, GA27-2739

- *IBM 3270 Information Display System Configurator*, GA27-2849

- *IBM 3270 Information Display System–Character Set Reference*, GA27-2837

- *IBM 3270 Information Display System Installation Manual–Physical Planning*, GA27-2787

- *IBM 4300 Processors Installation Manual–Physical Planning*, GA24-3667

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Figures

Frontispiece. IBM 3178 Display Station (Standard Arrangement)

Frontispiece. IBM 3178 Display Station (Optional Arrangement, see note)

Note: With optional extension cables, available as an accessory, the IBM 3178 logic element can be placed up to 2.1 meters (82.7 inches) away from the display and keyboard elements. The logic element can be positioned horizontally on a shelf or other support, or with an optional mounting bracket, available as an accessory, can be positioned vertically when attached to a wall, desk, or other vertical surface. Both optional extension cables and the mounting bracket are available in the U.S., Americas, and Far Eastern countries only.

Chapter 1. Introduction

The IBM 3178 Display Station is a general-purpose display station which is designed to use the same commands and orders used by the IBM 3278 Model 2 Display Station. The station has three models: Model C1 has a 75-key data-entry keyboard (76-key keyboard for Japanese Katakana); Model C2 has an 87-key typewriter keyboard (88-key keyboard for Japanese Katakana); Model C3 has an 87-key typewriter keyboard, whose layout is identical to the layout provided with RPQ 8K1038 for the IBM 3278 Model 2. Some differences exist between the IBM 3178 and the IBM 3278 Model 2, and are described later in this chapter.

This station operates when attached to the IBM 3274 Control Unit or IBM 3276 Control Unit Display Station, or to the IBM 4321/4331 Processor through the Display/Printer Adapter (DPA).

1.1 Work-Station Elements

The IBM 3178 Display Station consists of three work-station elements: the video element, the keyboard element, and the logic element. The video and keyboard elements are connected to the logic element by cables. The modular design enables the user to set up the station, and later to relocate or remove it without the help of service representatives.

Figure 1-1 shows the location of each work-station element.
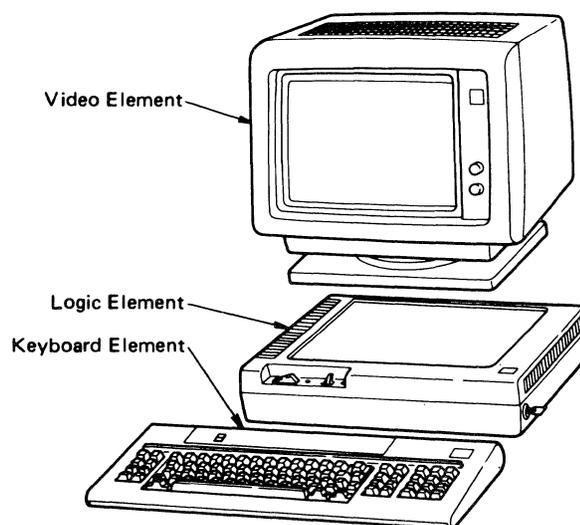
Figure 1-1. Work-Station Elements

1.1.1 Video Element

The video element has a 30-centimeter (cm) (12-in.) monochrome cathode-ray tube (CRT) display screen, which can display up to 24 lines of 80 characters each (1920 characters). The 25th line is for indicating various operator messages.

1.1.2 Keyboard Element

Model C1 has a 75-key, EBCDIC, data-entry keyboard (76-key keyboard for Japanese Katakana), the numeric keys of which are grouped for easier data entry.

Model C2 has an 87-key, EBCDIC, typewriter keyboard, (88-key keyboard for Japanese Katakana), which has 12 more keys for the operator to select additional programming functions.

Model C3 has an 87-key, EBCDIC, typewriter keyboard, the layout of which is identical to the layout provided with RPQ 8K1038 for the IBM 3278 Model 2.
This keyboard layout provides a numeric keypad and several other key position changes to the Model C2 keyboard for easier use in certain applications.

Figure 4-3 shows the layout for each keyboard.

1.1.3 Logic Element

The logic element provides power to the attached video element and keyboard element, and controls all IBM 3178 functions. The logic element also has a cable connection for a communication interface.

1.2 Characteristics of the IBM 3178

The following characteristics of the IBM 3178 are related to operation. For details about operator controls, switches, and keyboard key functions, see Chapter 4.

- A cursor indicates where the next character will appear on the display surface. The operator can select from two types of cursors: normal and alternate. The normal cursor is an underline, and the alternate cursor is block-shaped which, when placed over a character, reverses the image of the character within the block-shaped cursor. The operator also can cause either cursor to blink or remain steady.

- The Brightness and Contrast Control knobs are two distinct knobs that make it easier for the operator to adjust the display image.

- Operational status indications appear in the operator information area, which is at the bottom of the display surface (row 25), outside of the user data area.

- An audible alarm alerts the operator to various conditions, such as when data being entered is nearing the end of the data area. In addition, the alarm can be activated by the application program.

- The volume of the audible alarm can be adjusted by the Audible Alarm Volume Control knob, which is at the rear of the logic element.

- The keyboard element has a click that can be turned on or off by pressing the Click key. The click, when turned on, causes a clicking sound as each key is pressed. The clicking sound helps the operator determine if the keyboard operation is normal.

- The keyboard attaches to the logic element by a cable, so it can be moved (with limitations) to add to the operator's comfort and efficiency.

- Certain keys on the keyboard are typematic; that is, they will repeat their function for as long as they are pressed.

- The Monocase/Dualcase switch enables the operator to select whether characters will be displayed in all uppercase or in uppercase and lowercase. This switch is not applied to the Japanese Katakana keyboards.

- The TEST/NORMAL switch, when placed in the TEST position, can be used for problem analysis and resolution (see *IBM 3178 Display Station Operator Reference Guide,* GA18-2128, for details).

- The display image is a high-quality, 7- by 14-dot character matrix in a 9- by 16-dot matrix.

- The audible alarm control function and the numeric lock features are available as basic functions.

- A video element stand, attached to the video element, enables the operator to tilt the video element vertically 0 to 20 degrees (-2 to 20 degrees for the stations for Europe, the Middle East, and Africa) and turn it up to 90 degrees in either direction for viewing comfort.

- With use of optional extension cables, provided as an accessory, the IBM 3178 logic element can be placed up to 2.1 meters (82.7 inches) away from the display and keyboard elements. With an optional mounting bracket, provided as an accessory, the logic element can be oriented vertically and attached to a vertical surface. These accessories are available in the U.S., Americas, and Far Eastern countries only. For more details about these accessories, refer to Section 1.8 in this chapter.

- Because the keyboard is connected to the logic element by a cable, the keyboard can be moved up to 90 cm (3 ft) for added operator comfort.

- Both the 75-key and 87-key keyboards (76-key and 88-key keyboards for Japanese Katakana) have layouts that are familiar to typists, data-entry operators, and system operators; however, the keyboards are thinner and lighter than those of the IBM 3278 Model 2.

- The security keylock, when in the Off position or when removed from the logic element, prevents the entry, modification, and display of data.

1.3 Compatibility with the IBM 3278 Model 2

The IBM 3178 is designed to be compatible with the IBM 3278 Model 2. Figure 1-2 is a comparison table for the two terminals.

Features and Accessories	Terminal Type	
	IBM 3278 Model 2	IBM 3178
Keyboard		
75-Key Data-Entry/Keypunch	X	—
75-Key Typewriter (EBCDIC)	X	—
75-Key Data-Entry (EBCDIC)	X	X (Model C1)
87-Key EBCDIC Typewriter	X	X (Model C2)
87-Key EBCDIC Typewriter	X (RPQ 8K1038)	X (Model C3)
Security Keylock	X	X
Audible Alarm	X	X
Numeric Lock	X	X
Selector Light Pen	X	—
Magnetic Slot Reader	X	—
Magnetic Hand Scanner	X	—
Extended Character Set	X	—
Programmed Symbols	X	—

Note: X Indicates support by the station, and — indicates no support.

Figure 1-2. Comparison Between the IBM 3178 and the IBM 3278 Model 2

The commands and orders for the IBM 3178 are the same as those for the IBM 3278 Model 2 under the IBM 3270 Information Display System or IBM 4321/4331 Processor. For detailed information about commands and orders, see the following manuals:

- *IBM 3274 Control Unit Description and Programmer's Guide*, GA23-0061

- *IBM 3276 Control Unit Display Station Description and Programmer's Guide*, GA18-2081

- *IBM 4331 Processor Display/Printer Adapter Component Description*, GA33-1536

1.4 Attachment

The IBM 3178 can be used in the IBM 3270 Information Display System and IBM 4300 Processor Complex. When used in the IBM 3270 system, it is attached to the IBM 3274 Control Unit or to the IBM 3276 Control Unit Display Station. When used in the IBM 4300 Processor Complex, it is attached through a Display/Printer Adapter (DPA) to the IBM 4321/4331 Processor. Figure 1-3 shows examples of the IBM 3178 in a system configuration.

When you attach your IBM 3178 models C1 and C2 with the Swiss Bilingual German keyboard, Swiss Bilingual French keyboard, or Canadian Bilingual French keyboard to either IBM 3274, IBM 3276, IBM 4321, or IBM 4331, you need one of the following RPQ features. For further information about the RPQ features, please contact your IBM sales representative.

	RPQ Feature Number			
	Swiss Bilingual German	Swiss Bilingual French	Canadian Bilingual French	
IBM 3274	7H0394	7H0394	8K1012 Configuration Support A and B	8K1013 Configuration Support C
IBM 3276	7H0396	7H0396	8K1014 Without Feature Code 1068 (plant installation only)	8K1015 With Feature Code 1068 (plant installation only)
			8K1055 Without Feature Code 1068 (field installation only)	8K1054 With Feature Code 1068 (field installation only)
IBM 4321 IBM 4331	UC1603*	UC1813**	Not Available	

  * Swiss-German (not bilingual)
** Swiss-French (not bilingual)

When you attach your IBM 3178 model C3 to either an IBM 3274 or IBM 3276, you need one of the following RPQ features to be installed in the attached IBM 3274 or IBM 3276. The IBM 3178 Model C3 is not supported by IBM 4321/4331 processors.

	Required Control Unit RPQs	
Control Unit	With Numeric Lock	Without Numeric Lock
IBM 3274 with configuration A, B, or C support	RPQ 8K1035	RPQ 8K1034
IBM 3274 with configuration D support	RPQ 8K1165	RPQ 8K1164
IBM 3276	RPQ 8K1060	RPQ 8K1059

Figure 1-3. Examples of the IBM 3178 Display Station in a System Configuration

Host System

IBM 3704/3705 NCP

IBM 4321/4331 with
Display/Printer Adapter

IBM 3178

(see Note)

(15 units max.)

IBM 3178

IBM 3274

(32 units max.)

Loops: Directly attached or data-link-attached

IBM 3274 Model 51C

IBM 3178

(8 units max.)

IBM 3178

IBM 3276

IBM 3276

IBM 3178

(7 units max.)

IBM 3178

(7 units max.)

Note: If the IBM 3178 is to be connected to an IBM 4321 or
IBM 4331 processor, enter the machine type "3278,"
instead of "3178," into the configuration picture.

1.5 Program Support

The IBM 3178 works under the support programs for the IBM 4321/4331 Processor or IBM 3270 Information Display System.

1.6 Setup and Checkout

Each IBM 3178 Display Station is delivered with:

● Unpacking instructions (attached to the outside of the shipping carton)

● *Operator Reference Guide* (inside the shipping carton)

After the IBM 3178 is unpacked and put in place, it can be set up and checked out by following the steps in the *Operator Reference Guide.*

1.7 Problem Analysis and Resolution

The Customer Problem Analysis and Resolution (CPAR) guide in the *IBM 3178 Display Station Operator Reference Guide,* helps the user to analyze problems that occur when operating the IBM 3178, and to isolate problems to a failing element.

If the problem cannot be isolated to a failing element, the IBM 3178 can be sent to a designated IBM location for repair.

The failing element is packed in the IBM-provided shipping container and, with a completed IBM Service/Replacement Order form, is sent to an IBM Repair Center, where it is repaired and returned.

On-site assistance by an IBM representative in the performance of CPAR and replacement of the failing element with a user-owned spare is available on a billable hourly (per-call) basis.

In addition to On-site assistance, IBM provides the following service options for the IBM 3178 in the U.S.

1. Customer Carry-In Repair. The user may either deliver the failing element to an IBM Service/Exchange Center or package the failing element and ship it to an IBM Service/Exchange Center for repair.

2. Customer Carry-In Exchange. The user may deliver the failing element to an IBM Service/Exchange Center for exchange.

3. Customer On-Site Exchange. IBM brings a replacement element to the user's site using a courier or parcel service.

4. IBM On-Site Exchange. IBM brings a replacement element to your site, installs and tests it.

The service offerings in the Americas (other than the U.S.) and Far Eastern countries may differ by countries; contact your IBM representative for additional information.

Requests for service should be directed to the National Support Center by dialing toll-free 800-428-2569 in the continental U.S. and Puerto Rico; Hawaii and Alaska users may call collect to 312-986-7541.

In some countries in Europe, the Middle East, and Africa, if the user has an IBM on-site service contract, an IBM customer engineer will visit the user's site and repair the defective element on-site.

1.8 Accessories

Two accessories are optionally available in the U.S., Americas, and Far Eastern countries only, for the IBM 3178 installations where it is desired to place the logic element away from the display and keyboard elements.

One accessory consists of two extension cables. A cable to extend the distance from the keyboard element to the logic element, and a cable to extend the distance from the display element to the logic element. Each cable is 2.1 meters (82.7 inches) in length. With these cables, the logic element may be placed on a shelf, bookcase, or table at the height of 0.6 meter from the floor.

A second accessory consists of a mounting bracket for use where vertical orientation of the logic element is desired. The extension cables described above are required when using this bracket, which may be attached to a wall, desk, or other vertical surface at the height of 1.0 meter from the floor.

The logic element must be installed where the IBM 3178 user can switch power off quickly in an emergency. Sufficient space for cooling should be allowed.

Chapter 2. Physical Description

This chapter provides the physical dimensions of the IBM 3178, its service clearances, and its environmental requirements to help you plan your office layout. The physical planning template in Appendix C can also be used for your floor plan.

Planning and site preparation information for the IBM 3178 is given in Appendix A.

Plan View

Metric Unit	English Unit
33 mm	1.3 in.
88 mm	3.5 in.
100 mm	3.9 in.
228 mm	9.0 in.
280 mm	11.0 in.
333 mm	13.1 in.
348 mm	13.7 in.
355 mm	14.0 in.
380 mm	15.0 in.
400 mm	15.7 in.
421 mm	16.6 in.
494 mm	19.4 in.
760 mm	29.9 in.
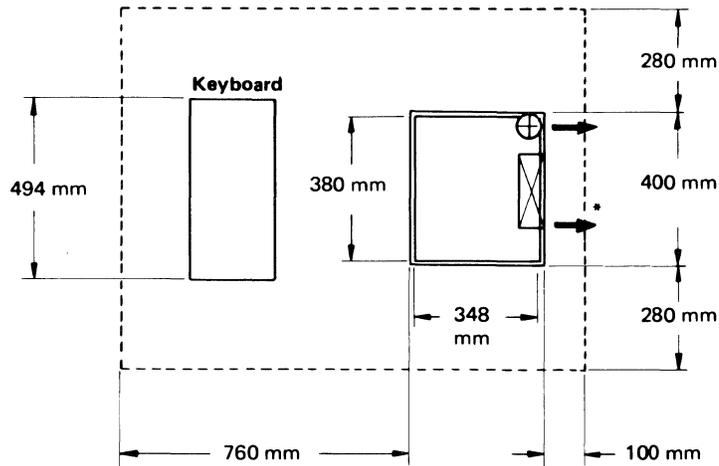
*: Connector Area

Side View

⬚ : Cable entry and exit area in base of unit

⊕ : Power cord Exit

Weight of Each Element
Video: 6.9 kg (15.2 lb)
Keyboard: 3.1 kg (6.8 lb)
Logic: 3.7 kg (8.1 lb)
Video Element
Stand: 1.2 kg (2.6 lb)
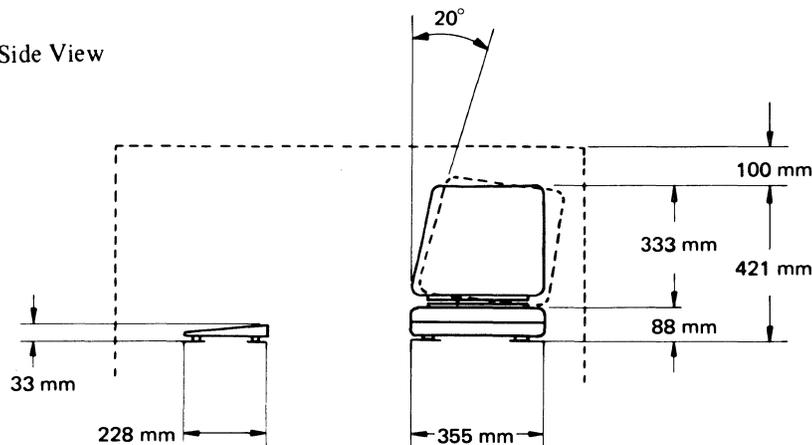
Notes:

1. The video element can be tilted 0 to 20 degrees from the vertical surface and turned 90 degrees to the right or left. For Europe, the Middle East, and Africa, the tilt angle is -2 to 20 degrees.

2. The widths of both 76-key and 88-key Japanese Katakana keyboards are 514mm.

3. The length of the power cord is 1.8 meters for the U.S. and Canada.
   For information about the power cord's length for other countries, see Appendixes E and F.

Specifications

Service Clearances

	Front	Rear	Top	Right	Left
mm	760	100	100	280	280
in.	29.9	3.9	3.9	11.0	11.0
				See Note.	See Note.

Note: Right and left service clearances can be reduced to the minimum clearances required for IBM 3178 cooling and operating—100 mm (3.9 in.) on each side.

Environment Requirements:

	Operating Environment	Nonoperating Environment
Temperature: Relative Humidity: Maximum Wet Bulb: Maximum Elevation:	10° to 40.6°C (50° to 105°F) 8% to 80% 27°C (80°F) 2133 m (7,000 ft)	10° to 51.7°C (50° to 125°F) 8% to 80% 26.7°C (80°F) — —

Heat output: 50 watts (170 BTU/hr)
Power consumption: 50 watts (170 BTU/hr)
Airflow: Natural air convection

Chapter 3. Functional Description

The main functions of the IBM 3178 Display Station are to display data transferred from the processor and to transfer data entered from the attached keyboard element to the processor. The displayed data can be changed or removed by the operator using the keyboard element and then returned to the processor for storage or additional processing.

This chapter provides information about the basic theory of display and keyboard functions related to communications with the host processor. For information about the actual operation, see Chapter 4.

3.1 Display

The IBM 3178 is a buffered display. Data displayed on the display surface is stored in coded form in a display buffer; the buffer contains as many locations as there are character positions on the display surface. The data may be loaded from the processor by the application program or from the attached IBM 3178 keyboard element. Up to 1920 characters (24 rows of 80 characters each) of user data can be displayed. In addition, the operator information area, line 25, which is separated by a horizontal line, displays various messages (indicators) for the operator.

Display data stored in the buffer is presented to the operator on the display surface as alphameric characters and symbols. A fixed relationship exists between the address of a character in the buffer and the location of that character on the display surface. Figure 3-1 shows the concept of the buffered display.
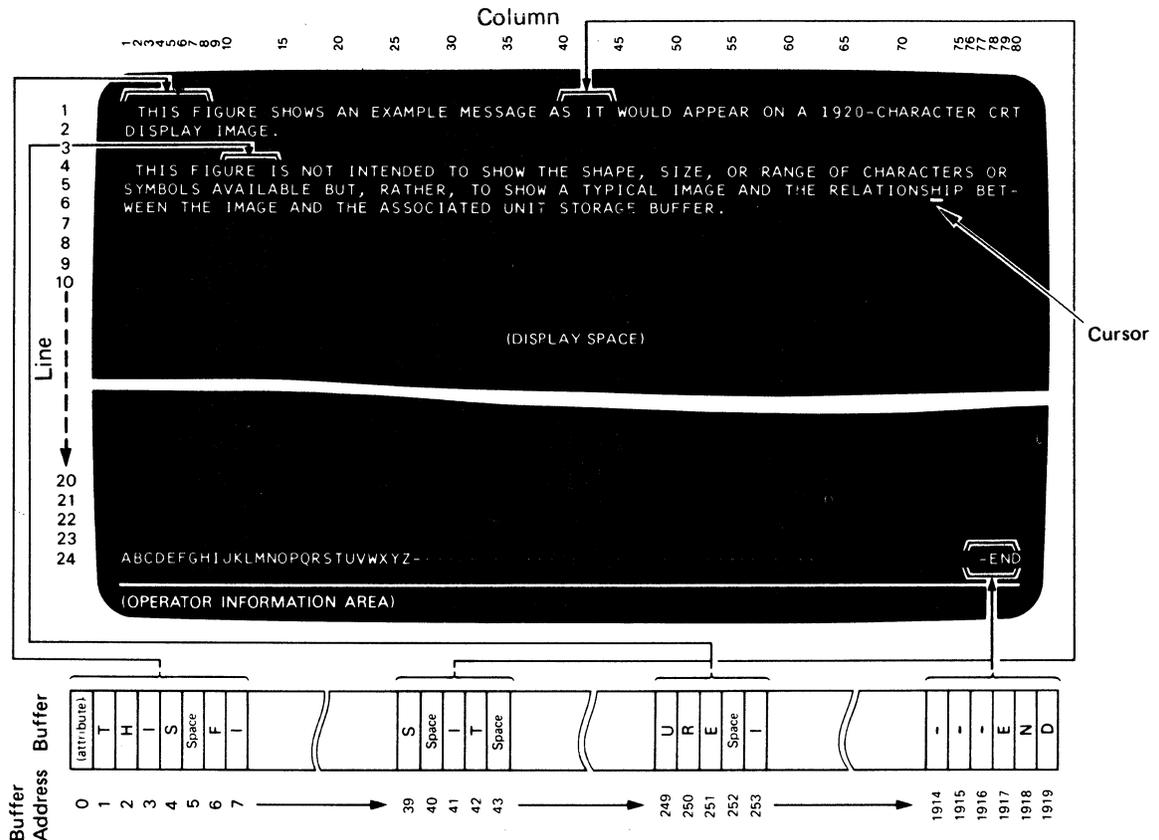
Figure 3-1. Relationship of Buffer Location and Display Surface Character Position

Display images can be formatted or unformatted. A formatted display is one that has separate fields defined by the application program. The first character position in each field has an attribute character that defines the characteristics of the field.

An unformatted display is one that has no defined field. An operator can enter data into any position of the display surface.

3.1.1 Cursor

A special symbol, called a cursor, is displayed on the display surface to indicate where the next character entered from the keyboard will be stored. The cursor may appear as a steady underscore or rectangular symbol by pressing the Alternate Cursor (AltCr) key. You may also change the cursor from a steady state to blinking, and from blinking back to a steady state by using the Cursor Blink (Cursr Blink) key.

When the display is turned on, the cursor is automatically generated and displayed in the first location of the display surface. The cursor can be moved by keyboard operations and by programming. The cursor movement or location is not affected by field attributes.

3.1.2 Display Fields

The application program can organize the display space into display fields. Each field has a field attribute character that defines the start of the field; the character occupies a character location in the buffer. A field wraps from the last character location on one line to the first character location on the next line or may wrap from the last character location of the last line (column 80 of line 24) to the first character location of the first line.

Display fields simplify operations for both the operators and programmers. Headings can be displayed to prompt the operator as to the data that should be entered, and the program can identify fields that contain entered data without reading the entire display buffer. When data is being entered into a formatted display, an attribute character acts like a tab stop; pressing the tab key advances the cursor from its current position to the first character position in the next unprotected field. (An unprotected field is one that accepts data input from the keyboard element.)

The example in Figure 3-2 shows the versatility of formatted displays. In this example, the solid characters represent the displayed form of characters stored in the buffer. The dotted squares represent the character locations corresponding to attribute characters at the start of each field. The dotted characters represent a field of data stored in the buffer, but defined by the program as nondisplayable: that is, not to be displayed to the operator.

☐NAME :☐JOHN B DOE
☐SALARY ☐12823
☐JOB TITLE :☐WRITER
☐PHONE #:☐383-7628

Figure 3-2. Example of the IBM 3178 Formatted Display

3.1.3 *Field Attribute Character*

The field-attribute character occupies the first character location of each display field in a formatted display; the corresponding character location on the display surface is always blank. Characteristics set by the field-attribute character are:

- Protected or unprotected. A protected field is one in which the operator cannot enter, delete, or change data; an unprotected field is available for the operator to enter, delete, or change data; the unprotected definition classifies a field as an input field.

- Alphameric or numeric. Subject to its being unprotected, an alphameric field is one into which an operator enters data normally, using the shift keys as required. When the cursor enters a field defined as numeric, the keyboard is automatically placed into the shift required to enter numeric characters ("NUM" appears in the operator information area). The operator can then enter only numerals (0 through 9), the decimal symbol(.), the minus sign (-), and the duplicate character; any other character locks the keyboard. The operator can enter characters in the uppercase shift (⬆) for the 87-key keyboard, or in the numeric shift (⬆) or alphabetic shift (⬇) for the 75-key keyboard, by holding down the appropriate shift key. See the description of each shift key in Chapter 4.

- Normal Display, Nondisplay, or Intensified Display. Characters entered from the keyboard into a field defined as normal display, nondisplay, or intensified, are placed in the buffer for possible transfer to the processor later, but the way they are displayed differs. Characters in a field defined as normal display appear on the display surface, with no intensification; characters in a field defined as nondisplay are not displayed; and characters in a field defined as intensified display appear brighter than other characters.

- Detectable or Nondetectable. A field defined as detectable can be detected for an application, such as menu selection, by pressing the Cursr Sel (Cursor Select) key while the cursor is within the field. The data in the field detected will be transferred to the processor for further processing. A field defined as nondetectable cannot be detected by pressing the Cursr Sel key.

3.2 Automatic Skip

When a character is entered into the last character location of an unprotected data field, the cursor is repositioned according to the attribute character describing the next field.

If the field attribute character defines the next field as alphameric and either unprotected or protected, or as numeric and unprotected, the cursor skips the attribute character and is positioned in the first character location of that field.

If the field attribute character defines the field as numeric and protected, the cursor automatically skips that field and is positioned in the first character location of the next unprotected field.

Chapter 4. Operations

The IBM 3178 operator communicates with the host through a 75-key EBCDIC data-entry keyboard (76-key keyboard for Japanese Katakana) or an 87-key EBCDIC typewriter keyboard (88-key keyboard for Japanese Katakana). The functions of some of the keys are dependent on the control unit to which the IBM 3178 is attached.

As stated in Chapter 1, the IBM 3178 works under the same conditions as the IBM 3278 Model 2. Therefore, when other publications are referenced for more information about a topic, the reader should read the information pertaining to the IBM 3278 Model 2 in the referenced publications.

4.1 Operator Controls

The operator has controls to switch power on and off, adjust the display brightness and contrast, adjust the volume of the audible alarm, and call internal tests. Figure 4-1 shows the locations of switches and lights.
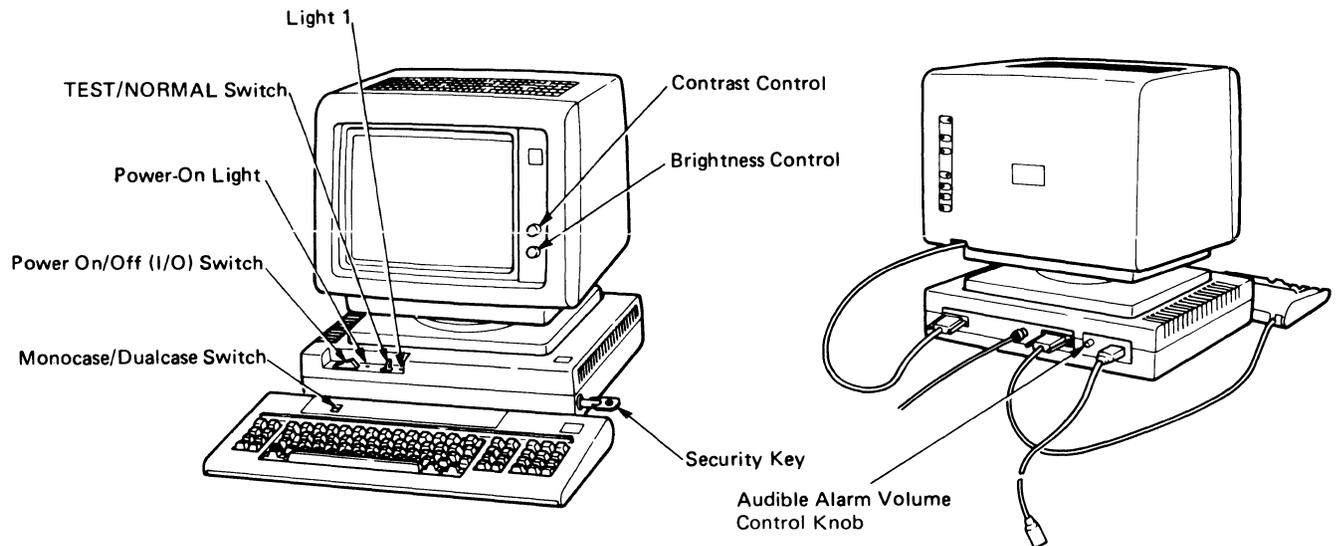
Note: This switch is not available with the Japanese Katakana keyboards.

Figure 4-1. Operator Controls

4.1.1 Brightness and Contrast Controls

The Brightness and Contrast controls are on the front of the video element. The Brightness control adjusts the brightness of the characters on the display surface. The Contrast control adjusts the contrast between the characters and the background of the display. It also adjusts the contrast between the characters in a normal field and those in a highlighted field.

4.1.2 Audible Alarm Volume Control

This control is at the rear of the logic element and enables the operator to adjust the sound level of the alarm. The highest volume level is designed for the typically noisy computer or office area.

4.1.3 Power On/Off (I/O) Switch

This switch (I/O) is at the upper left of the logic element. This switch applies ac power when set to the On (I) position and starts the self-diagnostic tests to check the IBM 3178 functions. When set to the Off (O) position, ac power is removed.

4.1.4 TEST/NORMAL Switch

This switch, when set to the TEST position, logically disconnects the IBM 3178 from the system, and the self-diagnostic tests automatically run to check the IBM 3178 functions. This switch is used for problem analysis and resolution, which is described in the *IBM 3178 Display Station Operator Reference Guide,* GA18-2128.

During normal operation, the switch must be set to NORMAL.

4.1.5 Monocase/Dualcase (A/A,a) Switch

This switch affects the display of alphabetic characters. With the switch set to the Monocase position (A), all lowercase and uppercase alphabetic characters transferred from the processor to the character buffer or keyed into the character buffer are displayed in uppercase only; in the buffer, the characters retain their lowercase and uppercase codes.

With the switch in the Dualcase position (A, a), alphabetic characters are displayed in lowercase and uppercase, as entered from the keyboard or transferred from the processor.

> **Note:** This switch is not available with the Japanese Katakana Keyboards.

4.1.6 Security Keylock

The security keylock provides a key-controlled lock for the IBM 3178. When the key is in the Off position, or is removed from the logic element, the message buffer is "locked" and the display surface data is blank except for the operator information area (line 25) and cursor. In the operator information area, a special symbol (✖○┐) appears. This state prevents the entry, modification, and display of data. The video display is not available to programmed read and write operations and to keyboard input.

4.2 Indicators

4.2.1 Power-On Light

This light comes on when power is applied to the IBM 3178. The light is on the upper-left front of the logic element and to the right of the Power switch.

4.2.2 Light 1

This light indicates, by blinking, that the logic element is functioning correctly when the TEST/NORMAL switch is set to TEST. When the switch is set to NORMAL and the IBM 3178 is connected to the working controller, the light stays on.

4.3 Keyboard Operations

As stated in Chapter 1, the IBM 3178 has three models: Model C1, C2, and C3. Model C1 has a 75-key data-entry keyboard. Models C2 and C3 both have 87-key typewriter keyboards, but the placement of several keytop functions is different. Model C3 provides a numeric keyboard not provided with Model C2. Figure 4-2 lists the nondata keys that are common to both types of keyboards except those keys indicated as blank columns. For the keyboard layouts for the languages in Europe, the Middle East, Africa, Americas and Far Eastern countries, see Appendixes E and F.

With the Model C1 (data-entry) keyboard, only uppercase alphabetic characters and numeric characters can be entered into the display buffer. With the Models C2 and C3, either uppercase or lowercase alphabetic characters and numeric characters can be entered.

On the display surface, alphabetic characters are displayed in uppercase or lowercase, as determined by the setting of the Monocase/Dualcase switch. However, any alphabetic character entered from the 87-key typewriter keyboard when the Monocase/Dualcase switch is set to Monocase, is displayed as an uppercase character, but is entered as a lowercase character in the display buffer.

Entry of an alphameric character from the keyboard into the display buffer occurs at the cursor location if the cursor is in an alphameric character location within an unprotected data field. (An attempt to enter an alphameric character into either a protected data field or an attribute character location is blocked.) Successful keyboard entry of the alphameric character causes the cursor to advance to the next character location within the unprotected data field.

4.3.1 Keys

The following sections describe the functions of each key during normal operations (TEST/NORMAL switch set to NORMAL).

Marking on key	Name of Key	
	75-Key Keyboard	87-Key Keyboard
Alt	Alternate Shift	Alternate Shift
AltCr	Alternate Cursor	Alternate Cursor
Attn	Attention	Attention
Clear	Clear	Clear
Cursr Blink	Cursor Blink	Cursor Blink
Cursr Sel	Cursor Select	Cursor Select
Dup	Duplicate	Duplicate
DvCnl	Device Cancel	Device Cancel
Enter	Enter	Enter
Erase EOF	Erase to End-of-Field	Erase to End-of-Field
Erlnp	Erase Input	Erase Input
Field Mark	Field Mark	Field Mark
Ident	Printer ID	Printer ID
Reset	Reset	Reset
Skip	Skip	
SysRq	System Request	System Request
Sys $		Sys $ *
Test	Test	Test
PA1—2	Program Access Keys 1—2	Program Access Keys 1—2
PA3	Program Access Key 3	

* This key is available only for 87-key typewriter keyboard with the numeric keypad of IBM 3178 Model C3.

Figure 4-2 (Part 1 of 2). Nondata Keys of the IBM 3178 Keyboards

Marking on key	Name of Key	
	75-Key Keyboard	87-Key Keyboard
PF1–10	Program Function Keys 1–10	Program Function Keys 1–10
PF11–24		Program Function Keys 11–24
▢→▢	Print	Print
🔊	Click	Click
🔒	Numeric Shift Lock	Uppercase Shift Lock
⇧	Numeric Shift	Uppercase Shift
⇩	Alphabetic Shift	
→❙	Tab	Tab
←	Backspace	Backspace
❙←	Back-Tab	Back-Tab
▢	Cursor Home	Cursor Home
←┘	New Line	New Line
ȃ	Insert	Insert
ȃ	Delete Character	Delete Character
↑	Cursor Up	Cursor Up
↓	Cursor Down	Cursor Down
←	Cursor Left	Cursor Left
→	Cursor Right	Cursor Right
◄◄	Double-Speed Cursor Left	Double-Speed Cursor Left
►►	Double-Speed Cursor Right	Double-Speed Cursor Right

Figure 4-2 (Part 2 of 2). Nondata Keys of the IBM 3178 Keyboards

Model C1 75-Key Data-Entry Keyboard (U.S. English)
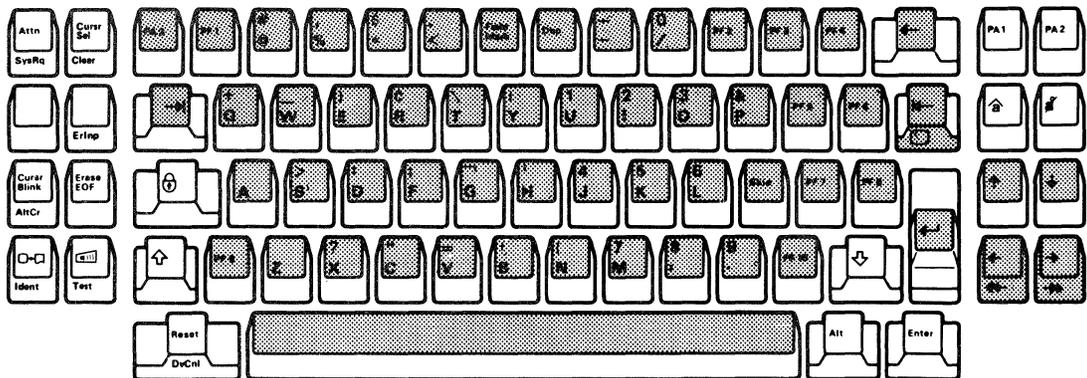
Model C2 87-Key Typewriter Keyboard (U.S. English)
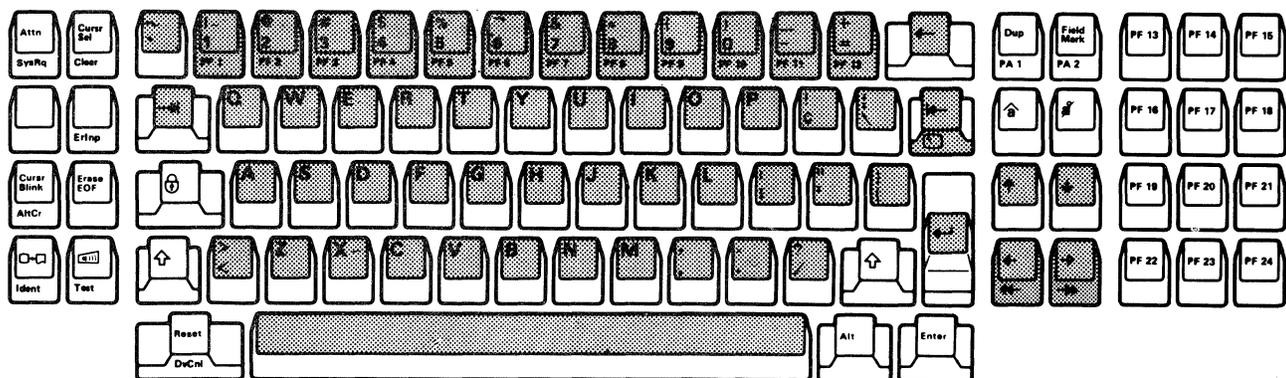
Model C3 87-Key Typewriter Keyboard with Numeric Keypad (U.S. English only)
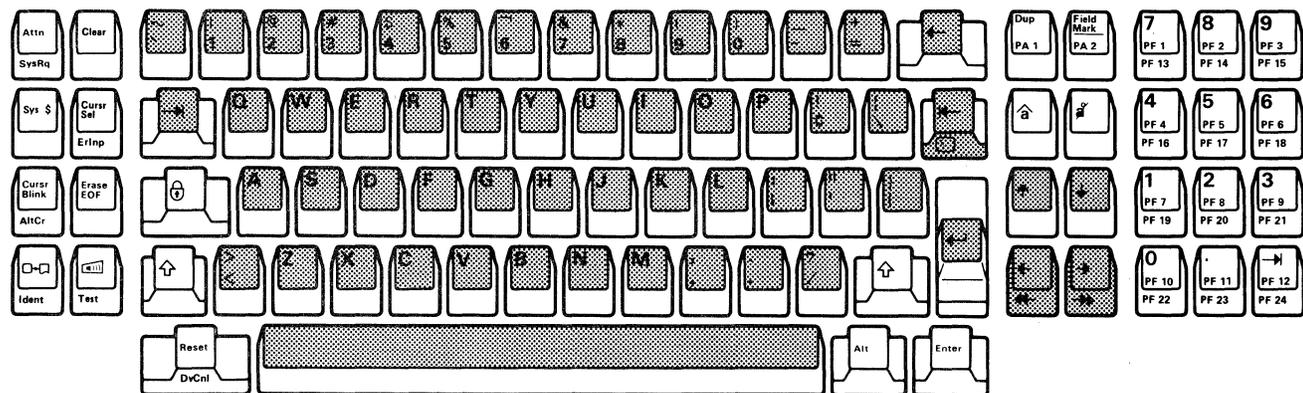
Note: Shaded keys repeat letters or functions when held down.

Figure 4-3. Keyboard Layouts—U.S. English

4.3.1.1 Alternate (Alt) Key

This key, when pressed, activates some of the keys, depending on the keyboard arrangements by model, as shown in the following table.

Model	Keys to be pressed with the Alt key
C1	SysRq, Clear, ErInp, AltCr, Ident, Test Cursor Home, DvCnl
C2	SysRq, Clear, ErInp, AltCr, Ident, Test Cursor Home, DvCnl, PA1, PA2, PF1 through PF12
C3	SysRq, ErInp, AltCr, Ident, Test DvCnl, PF13 through PF24

This key is also used with the Double-Speed Cursor Right and Double-Speed Cursor Left keys to move the cursor two locations at a time instead of one. Using the Alt key with a key that has no associated function produces no effect.

4.3.1.2 Alternate Cursor (AltCr) Key

Pressing the AltCr key while holding the Alt key down changes the cursor from underline type to rectangular type, or from rectangular type to underline type.

4.3.1.3 Attention (Attn) Key

Pressing this key causes an I/O interruption. The Attn key is operable in SNA/SDLC protocols during an SNA LU-LU session, except when:

- Inbound processing is queued for the display.

- A shutdown condition exists: no data can be transferred to the primary logical unit (PLU), but the PLU may continue to send data to the control unit.

- A data traffic reset state (for any SNA LU-LU session) exists: the control-unit secondary logical unit (SLU) cannot send data or commands to the host program.

- A prior Attn has not been completely processed (no indication).

Use of the Attn key in any session except an LU-LU causes a minus function symbol (✗-f) to be displayed.

The Attn key is inoperable in BSC and, if pressed, will cause a minus function symbol (✗-f) to be displayed.

When the control unit is operating in SNA/SDLC, use of the Attn key during a printer ID assignment ends the operation; the cursor reappears, and the previous printer ID is displayed in the operator information area.

4.3.1.4 Back Tab Key

When the cursor is at a field-attribute character position, at the first alphameric-character location of an unprotected data field, or at any character location of a protected data field, this key moves the cursor to the first alphameric-character location of the first preceding unprotected data field. When the cursor is at any alphameric-character location of an unprotected data field other than the first location, this key moves the cursor to the first alphameric-character location of that field.

In a display with no unprotected fields or no fields, the cursor is repositioned to the home position.

The Back Tab key has typematic capability.

4.3.1.5 Clear (Clear) Key

The Clear key clears all data on the display surface to nulls (except for the indicator row) and positions the cursor at the home position (row 1, column 1). When the Clear key is pressed, the IBM 3178 signals the program, informing it that the Clear key has been pressed. While this signaling is taking place, the Do-Not-Enter - Time ($\times$:⊘:) message appears, disabling the keyboard. The Clear key does not change the shift status and does not perform a reset function. The Alt key must be pressed and held before the Clear key is pressed (for Models C1 and C2 only).

4.3.1.6 Click Key

The Click key controls whether a clicking sound will be heard when a keyboard key is pressed. If the operator turns off the clicking sound (by pressing the Click key), no click will be heard as the keys are pressed, except under input-inhibited (Do-Not-Enter) conditions. If the operator presses the Click key again, a click will be heard under *normal* conditions.

The Lock, Shift, Reset, and Alt keys do not produce a clicking sound.

4.3.1.7 Cursor Blink (Cursr Blink) Key

Pressing the Cursor Blink key causes a nonblinking cursor to blink, or a blinking cursor to stop blinking.

4.3.1.8 Cursor Home Key (⬚)

This key moves the cursor to the first unprotected character position on the display surface. The Alternate shift (Alt) key must be pressed and held before the Cursor Home key is pressed.

4.3.1.9 Cursor-Move Keys

Four keys to the right of the main keyboard move the cursor one location at a time into any character location. These are Cursor Up, Cursor Down, Cursor Right, and Cursor Left keys. The Backspace key performs the same functions as the Cursor-Left key.

The cursor may be moved with these keys into any character location, including unprotected and protected alphameric-character and field-attribute character locations.

When the Alt (Alternate) key is pressed and held, the Double-Speed Cursor Right and Double-Speed Cursor Left keys will move the cursor two character locations at a time.

All these keys can cause the cursor to *wrap*. That is, if any of these keys are held down, the cursor will move off the display surface, either horizontally or vertically, and reappear at the bottom or top of the display surface in the same character column (vertical wrap), or at the next or preceding line of characters (horizontal wrap).

The cursor-move keys have typematic capability at a repeat rate of approximately 10 operations per second.

4.3.1.10 Cursor Select (Cursr Sel) Key

When the cursor is at a detectable field, the operator can press this key and select from a list or table of displayed items, and then cause these selections to be identified to the application program.

4.3.1.11 Delete Character Key ($\cancel{a}$)

If the cursor is at an alphameric-character location in an unprotected field, the Delete key removes the character at the cursor. The cursor does not move. All remaining characters in the unprotected field to the right of the cursor and on the same row, shift one character location to the left. Vacated character locations at the end of the row are filled with nulls. If the unprotected field contains more than one row, characters in rows other than the row identified by the cursor are not affected.

Pressing the Delete Character key when the cursor is within a protected data field disables the keyboard; no character locations are cleared, and the cursor does not move.

4.3.1.12 Device Cancel (DvCnl) Key

The operator can use the DvCnl key to cancel a current outstanding print request to a printer if the input is inhibited because of a Printer Busy or Printer Very Busy condition. A print request begun by the Print key is canceled, and the keyboard is restored to its operable condition. A host print request also is canceled, and a negative response is sent to the host. The Printer Busy symbol is replaced by the Time symbol.

The DvCnl key also is used to remove either the Printer Not Working symbol or Printer Failure symbol and to restore the keyboard.

The Alt key must be pressed and held when the DvCnl key is used.

4.3.1.13 Duplicate (Dup) Key

Operation of this key causes a unique character code to be entered into the display buffer and a Tab key operation to be performed. The Dup character provides a means of informing the application program that a *duplicate* operation is indicated for the rest of the field in which the Dup character is located. The Dup character is transferred as a Dup code when the data is read from the display to the program. No duplicate operation is performed at the IBM 3178. The application program determines the use of the Dup key. The Dup character, when stored in a device buffer, is displayed as an asterisk (*) when the Monocase/Dualcase switch is set to Monocase. It is displayed as an asterisk with an overscore (*) when the Monocase/Dualcase switch is set to Dualcase. Pressing the Dup key when the cursor is at a field-attribute character location, or within a protected data field, disables the keyboard; no character locations are cleared, and the cursor does not move.

4.3.1.14 Enter Key

Pressing the Enter key tells the program that the operator has completed the message and is ready for the information on the screen to be entered into the host system. While the IBM 3178 is signaling the program, the Do-Not-Enter — Time (✗ ⌖) message appears in the operator information area, disabling the keyboard.

4.3.1.15 Erase Input (ErInp) Key

This key clears all unprotected character locations to nulls, and moves the cursor to the first unprotected character location on the display surface.

The Alternate Shift (Alt) key must be pressed and held before the ErInp key is pressed.

In a buffer with only protected data fields, no character locations are cleared and the cursor is repositioned to the home position.

If the display contains no field, the entire buffer is cleared to nulls and the cursor is repositioned to the home position.

4.3.1.16 Erase to End-of-Field (Erase EOF) Key

If the cursor is at an alphameric-character location in an unprotected data field, this key clears the character at the cursor position and all characters remain in the field to the right of the cursor. The character locations in that field are changed to nulls.

The Erase EOF operation can wrap from the end of the last line of the display to the end of the field. The cursor does not move as a result of operating this key.

Operation of this key when the cursor is at an attribute character location or within a protected data field causes a Do-Not-Enter condition and disables the keyboard; no character locations are cleared, and the cursor does not move.

If the display contains no fields, all character locations from the cursor to the last character location on the bottom line are erased.

4.3.1.17 Field Mark Key

Pressing this key causes a unique character code to be entered into the display buffer. The field mark character provides a means of informing the application program of the end of a field in an unformatted buffer, or of a subfield in a formatted buffer. The field mark character is transferred as a field mark (FM) code when the data is read from the display to the program. The field mark character, when stored in a device buffer, is displayed as a semicolon with an overscore ($\bar{;}$).

Operating this key when the cursor is at a field-attribute character location, or within a protected data field, disables the keyboard; no character locations are cleared, and the cursor does not move.

4.3.1.18 Insert Mode Key (⟨)

This key places the IBM 3178 in the insert mode of operation. The insert symbol (⌃) is displayed in the operator information area (line 25 on the display surface), where status and operator messages appear.

If the cursor is in an unprotected data field that has a null character either in the character location identified by the cursor or in any character location in the field beyond the cursor, and an alphameric-character key is pressed, that alphameric character will be entered at the cursor. The character formerly occupying the cursor location and all remaining characters within the field (except for null characters or characters to the right of null characters) will be shifted one character location to the right.

If the cursor is at a null at the time of the insert operation, no character shifting occurs.

After all null characters at or beyond the cursor location in the field have been overwritten, or if there were no null characters, operation of an alphameric key disables the keyboard. Field-attribute characters are not shifted as part of the insert operation.

If more than one row of characters is within the field, a character in the last character location of the row is shifted into the first character location of the next row.

When the cursor is at a field-attribute character location or within a protected data field, and the IBM 3178 is in the insert mode, operation of an alphameric key disables the keyboard; no character locations are cleared, and the cursor does not move.

Pressing the Reset or Enter key, or any other key that causes host communications, returns the IBM 3178 to the normal mode.

4.3.1.19 New Line Key (↵)

This key moves the cursor to the first unprotected character location of the next line. If the display has no unprotected data fields, the cursor is repositioned to the home position. If the display contains no fields, the cursor is repositioned to the first character position of the next line.

The New Line key has typematic capability at a rate of approximately 10 skips per second.

4.3.1.20 Printer ID (Ident) Key

The Printer ID key assigns a printer or printer class for local printing of the display image. (The Alt key must also be pressed with the Ident key.) When the Printer ID key is pressed, the cursor disappears from the display surface, and the Assign Printer symbol (□—□ – –) appears. The operator may then enter the printer ID or printer class.

The printer ID or printer class number appears in the two underlined locations of the □—□ – – symbol. Pressing the Printer ID key completes an assignment if a printer is available.

If the specified printer is not authorized, the keyboard is locked, and the Do-Not-Enter Operator Unauthorized symbol (✕⚡✕) is displayed. If the printer ID or printer class is not valid, the keyboard is locked, and the Do-Not-Enter, What Number symbol (✕⚡#?) is displayed. The contents of the printer status field in the operator information area are displayed for the Do-Not-Enter condition, the cursor appears, and the keyboard is locked. The operator must reset and then re-try the printer ID sequence.

If the selected printer ID or printer class is valid and authorized for this display, the connection indicator will change to indicate the new connection, and the printer ID entry mode ends. The cursor reappears, and the keyboard remains unlocked.

When the terminal is in the printer ID entry mode, the following rules apply:

- Numeric information is displayed at the "nn" position in the printer status field. Each character displayed in the nn position should be checked.

- The Reset key function operates normally and causes the printer ID entry mode to end. The cursor reappears, and the contents of the printer status field are displayed.

- The Attn and DvCnl keys, and host-initiated read and write operations operate normally in the IBM 3276, except that the IBM 3276 printer ID entry mode ends when the start-print bit (bit 4) in the write control character (WCC) of the host Write commands is on. In the IBM 3274, however, the printer ID entry mode ends, the cursor reappears, and the contents of the printer status field are displayed in the operator information area.

- Other keys that function during a keyboard-inhibit condition also operate normally while in the printer ID entry mode.

- All other keys that do not function during keyboard-inhibit conditions cause the Do-Not-Enter What symbol (✕?+) to be displayed and end the printer ID entry mode. The cursor then reappears, and the contents of the printer status field are displayed in the indicator row.

4.3.1.21 Print Key (□→▯)

When the Print key is pressed, the data on the IBM 3178 display surface is printed by the printer attached to the same control unit. The printer used is specified by the □—□nn message on the right side of the operator information area, where nn is a printer address number.

4.3.1.22 Program Access (PA1, PA2 or PA3) Keys

The PA keys perform the function that their name implies; that is, they provide a means of signaling or communicating with the program. While the IBM 3178 is signaling the program, the Do-Not-Enter - Time (✕ ⏁) message appears in the operator information area, disabling the keyboard. The program operating in the host system at the time also determines how these keys are used. For Model C2 with the 87-key keyboard, the Alt (Alternate) key must be pressed and held before the PA1 or PA2 key is pressed.

4.3.1.23 Program Function (PF) Keys

Application programs can define the action that occurs when a PF key is pressed. This ability adds flexibility to the IBM 3178 keyboard and makes it a more powerful input device. Press the Alt key when you use the PF1 through PF12 keys on the Model C2 87-key keyboard, and the PF13 through PF24 keys on the Model C3 87-key keyboard.

4.3.1.24 Reset Key

The Reset key is used to recover from a Do-Not-Enter condition. When the keyboard is disabled, no keyboard operations are possible. The Reset key will not reset a disabled keyboard when a command is being executed for the device to which the keyboard is attached.

When the keyboard is disabled, symbols are displayed in the operator information area. Pressing Reset restores the keyboard, except when the Do-Not-Enter condition is Printer Busy, Printer Very Busy, Printer Not Working, or Time. Pressing Reset once resets multiple Do-Not-Enter conditions.

The Reset key is also used to return the keyboard to normal operation from the insert mode.

4.3.1.25 Shift Keys

The function of the shift key varies, depending on the type of keyboard: the 75-key data-entry keyboard or the 87-key typewriter keyboard.

Alphabetic Shift Key (75-Key Keyboard) (⇩):
This key selects the alphabetic shift and must be held down to enter alphabetic characters in a field that the program has defined as numeric.

Numeric Shift Key (75-Key Keyboard) (⇧):
When this key is pressed, the characters shown on the upper half of the key tops can be entered. When the cursor is in a numeric field, this key has no effect.

Uppercase Shift Key (87-Key Keyboard) (⇧):
When the operator presses and holds this shift key, the uppercase shift characters can be entered. The uppercase indication appears in the operator information area.

4.3.1.26 Shift-Lock Keys

The function of the Shift-Lock key varies, depending on the type of keyboard: 75-key data-entry keyboard or the 87-key typewriter keyboard.

Numeric Shift Lock Key (75-Key Keyboards Only) (🔒):
Pressing the Numeric Shift Lock key locks the keyboard in numeric shift; data characters shown on the upper half of the key tops can be entered. The numeric shift lock is canceled by pressing the key again; or, it can be temporarily overridden by holding down the Alphabetic Shift key.

Uppercase Shift Lock Key (87-Key Keyboard Only) (🔒):
Pressing the Uppercase Shift Lock key locks the keyboard in uppercase; data characters shown on the upper half of the key tops can be entered. The uppercase shift lock is canceled by pressing the Uppercase Shift key again.

4.3.1.27 Skip Key (75-Key and 76-Key Keyboards Only)

This key moves the cursor to the first character location of the next unprotected field.

4.3.1.28 Sys $ Key

Pressing this key causes a dollar sign to be entered at the cursor location without using the Shift key.

4.3.1.29 System Request (SysRq) Key

When the control unit operates in SNA/SDLC, the operator can use the SysRq key for switch procedures during system-services-control-point-to-secondary-logical-unit (SSCP-SLU) and primary-logical-unit-to-secondary-logical-unit (PLU-SLU) sessions. The SysRq key also starts keyboard reset and clear functions simultaneously. The key performs these functions regardless of the presence of Do-Not-Enter conditions, except when (1) inbound processing is queued for the display station, in which case the Do-Not-Enter What symbol (✗?+) appears, and (2) Printer Busy, Printer Very Busy, or Printer Not Working is displayed, in which case there is no response when the SysRq key is pressed.

In non-SNA systems, the SysRq key performs the test-request function. The automatic reset function is not available.

The Alt key must be pressed and held while the SysRq key is pressed.

4.3.1.30 Tab Key (→⊦)

This key moves the cursor to the first character location of the next unprotected data field. In a display with no unprotected fields or no fields, the cursor is repositioned at the home position (row 1, column 1).

4.3.1.31 Test Key

When the Test key is pressed while the Alt key is held down, the display surface is cleared and reset, and test functions resident in the control unit are invoked, unless the Printer Busy, Printer Very Busy, or Printer Not Working indication is displayed. Then, the Test key has no effect.

When the Test key is pressed, the IBM 3178 enters the test mode, and the test mode indication appears in the operator information area, unless the IBM 3178 is already in the test mode. The operator then identifies the test desired. For more details about these tests, see the *Operator Reference Guide,*(GA18-2128).

The operator ends the test mode by pressing the Test key again.

4.3.2 Numeric Lock Operations

In the Numeric Lock operation, the numeric characters (0-9), decimal sign, minus sign (-), and DUP may be entered by the operator in a field identified in the attribute byte as numeric and unprotected. When any other key that can enter a displayable character is pressed, the Do-Not-Enter symbol and the NUM symbol appear. Operation of the Reset key enables the keyboard (if disabled), and the Do-Not-Enter or NUM symbol disappears. The nondisplay/nonprint attribute bits (4 and 5) operate normally. The Numeric Lock function can be overridden as follows:

1. On a data-entry keyboard, any character can be entered by pressing (and holding) the Numeric shift key or the Alpha shift key, depending upon the character to be keyed and then pressing the desired keys.

2. On a typewriter keyboard, any uppercase character or symbol can be entered by pressing the Shift key and then pressing the desired keys.

The numeric lock feature is available with two models: C1 for the 75-key data-entry keyboard and C2 for the 87-key typewriter keyboard, when either model is attached to the IBM 3274 Controller, IBM 3276 Control Unit Display Station, or the IBM 4321/4331 Processor under the configuration shown in Figure 1-3, "Example of the IBM 3178 Display Station in a System Configuration."

However, when you use the IBM 3178 Model C3, which has an 87-key EBCDIC typewriter keyboard, an RPQ as specified in the following table should be installed in the attached IBM 3274 or IBM 3276 Control Unit. Model C3 is not supported for attachment to the IBM 4321/4331 Processor

Control Unit	Required Control Unit RPQs	
	With Numeric Lock	Without Numeric Lock
IBM 3274 with configuration A, B, or C support	RPQ 8K1035	RPQ 8K1034
IBM 3274 with configuration D support	RPQ 8K1165	RPQ 8K1164
IBM 3276	RPQ 8K1060	RPQ 8K1059

Controller RPQ Requirement

4.3.3 Dead Keys on Canadian Bilingual French Keyboards

When the accent keys (´ ` ^ ¨) are pressed on the Canadian Bilingual French keyboards, the accent marks appear on the display, but the cursor does not move. These accent keys are referred to as *dead* keys. The character that is to receive the accent must be typed next. If the character is a valid one, a unique composite character is formed. See Appendix F for the layout of the Canadian Bilingual keyboards, the I/O codes, and the identification of valid accent characters.

Pressing an accent key places the keyboard in the dead-key mode until a valid second key is pressed. If the second character of a dead-key sequence is invalid, only the Shift, Alt, and Alternate Cursor keys work. Use of any other key ends the operation and causes an Input Inhibited Accent Plus What symbol to appear on the display surface (see Figure 4-6 for Do-Not-Enter symbols).

All other non-keyboard-related functions that occur during a dead-key sequence are performed normally. If performance of the function stops the dead-key sequence, the keyboard is inhibited and "What" is displayed after the function has been performed.

When any condition causes a dead-key sequence to stop, only an accent is displayed at the cursor position. The operator must reset and retype both the accent and the valid character.

4.3.4 Katakana Keyboard Operations

There are two types of Katakana keyboards: a 76-key data-entry keyboard and an 88-key typewriter keyboard. Appendix F shows the keyboard layouts.

The Katakana keyboard has the following four shift keys:

88-Key Typewriter Keyboard		76-Key Data-Entry Keyboard		Operator Message
英記号	Alpha Symbol	数字	Alpha Symbol Numeric	ALPHA ⇧
英数	Alphameric	英字	Alpha	ALPHA
カナ記号	KANA Symbol	カナ記号	KANA Symbol	カナ ⇧
カナ	Katakana	カナ	Katakana	カナ

The characters associated with each shift are shown in the corresponding location of the keytops. In normal operation, the appropriate shift key is pressed and released to enter the required shift; the keyboard remains in that shift until another is selected. The shift is shown in the operator information area (line 25).

On a 76-key data-entry keyboard, the Numeric Lock feature does not work while the Alpha, Numeric, Latin Shift, Lock, or upper-left shift key is being used.

4.3.5 Operator Information Area Messages

The types of messages, and where they appear in the operator information area for the IBM 3274, 3276, 4321, and 4331 with the Display/Printer Adapter, are shown in Figure 4-4.

Readiness and System Connection 1 6		Do Not Enter 9 17		Reminders 21 27		Shifts and Modes 37 41		Printer Status 60 64		80

Figure 4-4. Format of the Operator Information Area

There are some differences between the operator information area messages for the IBM 3178 attached to the IBM 3274 and IBM 3276, and those for the IBM 3178 attached to the IBM 4321 and IBM 4331 with the Display/Printer Adapter. The following sections describe the messages for each case.

4.3.5.1 Messages for the IBM 3178 Attached to the IBM 3274 and the IBM 3276

This section describes the information on the operator information area messages for the IBM 3178 when it is attached to the IBM 3274 and the IBM 3276.

Readiness and System Connection Symbols (locations 1 through 6)

Figure 4-5 explains the readiness and system-connection symbols that appear in locations 1 through 6 of the operator information area for the IBM 3274 and the IBM 3276.

Symbol	Name	Explanation
6	3276 Ready	The appropriate Ready symbol is displayed in location 1 when the IBM 3276 6 , or
4	3274 Ready	IBM 3274 4 to which the IBM 3178 is attached is ready (functional), and when the IBM 3178 itself is ready.
A B	Online A Online B	The Online A and Online B symbols govern transactions with the host system. Certain keyboard functions and the meaning of some symbols in the operator information area differ, depending upon which set of rules apply. These symbols are displayed in location 2.

Online A. The control unit is connected to the system under A rules. The A symbol appears in remote systems that use BSC, and in locally attached systems that use the IBM 3274 Model 1B, 1D, 21B, 21D, or 31D. Online A is turned on when the Write, Erase/Write, Erase All Unprotected, Copy, Read Modified, and Read Buffer commands are received.

The A symbol goes off when:

- An operator action causes host communications.

- The TEST/NORMAL switch is set to TEST, or the Test key on the IBM 3178 keyboard is pressed to place the IBM 3274 in the test mode.

Figure 4-5 (Part 1 of 2). Readiness and System-Connection Symbols

Symbol	Name	Explanation
		Online B. The control unit is connected to the system under **B** rules. The **B** symbol appears in systems that use SNA protocol, and is started by the completion of an Activate Physical Unit/Activate Logical Unit (ACTPU/ACTLU) command sequence. It goes off by: the execution of a Deactivate Physical Unit/Deactivate Logical Unit (DACTPU/DACTLU), including an internal DACTPU sequence; when the TEST/NORMAL switch is set to TEST; or when the Test key is pressed.
■	My Job	The display station is connected to the operator's application program. This symbol is displayed in location 3.
🔳	System Operator	This symbol is used with SNA protocol and indicates that the system operator system service control point (SSCP) session owns the display surface. Except for the Enter key, the program attention keys are not functional when this symbol is displayed. This symbol is displayed in location 3.
?	Unowned	The display station is connected to the system (using SNA only), but not to the operator's application program or to the system operator (control program). The SysRq key is used if a log-on procedure is required. This symbol is displayed in location 3.
TEST	Test	The display station is in test mode. Test mode is started or ended by pressing the Test key while holding the Alt key. TEST is displayed in locations 3 through 6. Test procedures are described in the following documents:

● *IBM 3276 Control Unit Display Station Problem Determination Guide*, (GA18-2014)

● *IBM 3178 Display Station Operator Reference Guide*, (GA18-2128)

● *IBM 3270 Information Display System Problem Determination Guide*, (GA33-3051) |
| N | In-Use Indicator (3274-51C; X.21 Switched Network Adapter feature) | Data transfer is taking place between the control unit and the host system. The In-Use indicator is displayed on all attached IBM 3178s when the control unit enters the X.21 data transfer state. |

Figure 4-5 (Part 2 of 2). Readiness and System-Connection Symbols

Do-Not-Enter Messages

All these messages have an X in location 9 (Do-Not-Enter), with other symbols in locations 11 through 17 that define why the input is disabled. The keyboard does not lock mechanically, but character entry from the keyboard is inhibited and a change in the click key (on to off, or off to on) indicates that the keyboard is disabled.

The Reset, SysRq, Attn, Test, DvCnl, Shift, AltCr, Cursr Blink, and Click keys are not disabled.

Also, during a host-initiated write (IBM 3274 only), or a data transfer from the display buffer to the printer buffer by a BSC Copy command (IBM 3274 and IBM 3276), a limited number of keystrokes will be accepted for processing, and the input is

not disabled. The IBM 3274 will hold up to four keystrokes and, if the queue capacity is not exceeded, will process the input normally when the host restores the keyboard. The IBM 3276 will hold at least two keystrokes and, if the queue capacity is not exceeded, will process the keystrokes when communication with the keyboard is restored. In either case, if the capacity of the queue is exceeded, all held keystrokes will be discarded, and the What symbol will be displayed.

Pressing the Reset key will remove the Do-Not-Enter condition and restore the keyboard, except when the Time, Printer Busy, Printer Very Busy, or Printer Not Working symbol is displayed.

Figure 4-6 explains the Do-Not—Enter symbols that appear in the IBM 3274 and IBM 3276.

Symbol	Name	Explanation
✕ :⟨	Time	Time is required for the system to perform a function. This symbol is displayed because of:

- Line protocol requirements

- A keyboard's being locked by the host, for example, during a host-initiated print operation

- Internal processing constraints of the control unit, such as the loading of the printer authorization matrix, which defines how display stations (source devices) use printers attached to the same control unit, from an IBM 3178 into an IBM 3274.

When SNA protocol is used, the keyboard will be restored and the Time symbol removed by a Write Control Character (WCC) that has the keyboard-restore bit set to 1.

If the IBM 3274 or IBM 3276 also receives a Change Direction (CD) that changes a data transfer state, a Send, or a Receive, the control unit will enter the Send state to send data to the host. However, if a CD was not received, the session will remain in the Receive state to receive data from the host when the WCC has the keyboard-restore bit set to 1.

In this state, all keys can be used except the Program Access (PA) and Print keys. Use of a PA key will result in the display of the Minus Function symbol (✕-f). If a WCC with the keyboard-restore bit set to 1 is not received, the display of the Time symbol is determined by whether or not the CD has been received, as follows:

- If the CD has not been received, the session remains in the Receive state, and the Time symbol remains displayed with the keyboard locked.

- If the CD has been received, the IBM 3274 and IBM 3276 enter the Send state and, if the keyboard was unlocked before receiving the command, the Time symbol is removed and the keyboard is restored. Otherwise, the Time symbol is replaced by the System Lock symbol (✕SYSTEM).

If the End Bracket (EB) bit, which indicates the end of a transaction, is received, the Time symbol is removed, and the keyboard is restored, regardless of the WCC setting.

Figure 4-6 (Part 1 of 6). Do-Not-Enter Symbols

Symbol	Name	Explanation
		When BSC protocol, or an IBM 3274 Model 1B, 1D, 21B, 21D, or 31D is used, the keyboard will be unlocked, and the Time symbol removed, if the WCC keyboard-restore bit is on, or if the keyboard had been unlocked prior to receipt of the command. Otherwise, the Time symbol will be replaced by the System Lock symbol.
✗SYSTEM	System Lock	The program has disabled the keyboard following an entry. The operator may receive a message and then press the Reset key to restore the keyboard. In systems that use SNA protocol, the System Lock symbol appears when the application program has replied to the last message sent by the operator and is requesting the operator to send the next message. At this time, however, the host has not unlocked the keyboard. (The keyboard-restore bit is not set in any WCC that follows the last message from the operator.)
		When the System Lock symbol appears in BSC systems, or in locally attached systems that use an IBM 3274 Model 1B, 1D, 21B, 21D, or 31D, the host is notified of the last AID generated.
✗◣ nn ✗◣ nnn	Machine Check	The display station is not working properly. The symbol is accompanied by two numbers (nn) if the IBM 3178 is attached to an IBM 3276, or by three numbers (nnn) if the IBM 3178 is attached to an IBM 3274. The numbers define the probable cause of the problem. Recovery procedures depend upon the type of error.
		For a description of the machine-check codes, refer to *IBM 3270 Information Display System: 3274 Control Unit Description and Programmer's Guide*, GA23-0061.
		Machine check symbols can almost always be reset by the operator's using the Reset, SysRq (SNA only), or Test keys.
✗↘⎯z⎯ nn ✗↘⎯z⎯ nnn	Communication Check	An attempt is made to cause host communications, and a communication-link error is detected while the Communication Reminder (⎯z⎯ nn or ⎯z⎯nnn) is displayed.
		Data cannot be sent. The Reset, Test, or SysRq (SNA) key should be pressed. This symbol is accompanied by two numbers (nn) if the IBM 3178 is attached to an IBM 3276, or by three numbers (nnn) if the IBM 3178 is attached to an IBM 3274. The numbers define the probable cause of the problem. (The Communication Reminder symbol is displayed as long as the condition exists.) For a description of the communication-check codes, refer to *IBM 3270 Information Display System: 3274 Control Unit Description and Programmer's Guide*, GA23-0061.
✗↥⎯⎯z⎯	Operator Commu- nication Check (3274-51C; X.21 Switched Network Adapter feature)	The operator has requested an X.21 function that is currently prohibited.
✗PROG nn ✗PROG nnn	Program Check	A programming error was detected in the data received by the control unit. Reset should be pressed, and the operation should be re-tried. This symbol is accompanied by two numbers (nn) if the IBM 3178 is attached to the IBM 3276, or by three numbers (nnn) if the IBM 3178 is attached to IBM 3274. The numbers define the probable cause of the problem. Refer to *IBM 3270 Information Display System: 3274 Control Unit Description and Programmer's Guide* GA23-0061, for a description of the program check.

Figure 4-6 (Part 2 of 6). Do-Not-Enter Symbols

Symbol	Name	Explanation
X?+	What?	The last input was not accepted. The What symbol appears when:

- Keystrokes are queuing during an unsolicited write or buffer transfer, and the capacity of the queue is exceeded. (The queue is not processed in this case.)

- Attn (IBM 3274 only) or SysRq was pressed while inbound processing queued for the device.

- Attn, SysRq, or Test was pressed during a Time condition that was caused by internal processing constraints of the IBM 3274 or IBM 3276.

- The operator continued to type while the Time, Printer Busy, or Printer Not Working symbol was displayed.

- Two conflicting operations have been attempted simultaneously, with one operation not serviced.

- Printer ID entry mode has ended abnormally. Pressing the Reset key restores the keyboard.

Because of uncertainty about what was accepted, the operator should check the contents of the display surface before repeating the operation. In addition:

1. If the Alt or a Shift key was used, press the key again; then, press Reset and re-try the operation.

2. When re-trying SysRq or Attn, repeated use of these keys may be necessary if inbound processing is queued.

Symbol	Name	Explanation
X-f	Minus Function	An unavailable function was requested. The Reset key should be pressed to restore the keyboard. Conditions that cause a Minus Function are:

- Use of an Attn, PF, or PA key while in an SSCP session, in the "unowned state," or prior to an ACTLU command; also, use of the Enter key in the "unowned state" or prior to ACTLU.

- Use of SysRq prior to receipt of ACTLU in SNA.

- The pressing of the Print key or any AID-generating key while in the Receive state with the keyboard unlocked.

- Use of Attn while operating with remote systems that use BSC, or with local systems that use an IBM 3274 Model 1B, 1D, 21B, 21D, or 31D.

- Use of SysRq, Attn, and any PA or PF key that is not specified for the test mode.

- Invoking of online test 0, when the control station is not the test station and the latter is either in session (SNA) or has the Time indicator on (in systems that use BSC, or in local systems that use an IBM 3274 Model 1B, 1D, 21B, 31B, or 31D).

- Use of the Ident key during a printing operation.

Figure 4-6 (Part 3 of 6). Do-Not-Enter Symbols

Symbol	Name	Explanation
✘o—ᴎ	Security Key	The security key is switched to Off and no operator input can be accepted. When the key is switched to On, this symbol disappears, but any other preexisting Do-Not-Enter conditions may then be displayed. The Reset key does not remove the Security Key symbol. The Shift, Alt Cursr, Cursr Blink, and Click keys, and associated symbols, and all other noninput disabled symbols will function when the Security Key symbol is displayed.
✘□—ᴎ	Printer-Not-Working	The printer assigned to the display station is not functioning, and no other printers of this class are available. If this symbol appears after the Print key was pressed, and if the Printer Failure symbol is not displayed, the printer assigned to the display (or the most available printer in the class) is not functional. The print request is canceled, and the DvCnl key should be pressed to restore the keyboard. (Reset has no effect.) Restoring the printer will not automatically remove the Printer-Not-Working symbol. If the Printer Failure symbol is displayed in the printer status area, the printer stopped during the last print operation. If the print operation was started with the Print key, DvCnl should be pressed to restore the keyboard. The display station indicator may precede a comparable indicator on the printer by as much as two minutes. The Printer-Not-Working symbol may also appear for a host-initiated print operation. Operators are not instructed to use DvCnl. But, if the key is used, the Printer-Not-Working symbol is replaced with the Time symbol, and the host must continue the operation. Subsequent receipt of outbound FM data will remove the Printer-Not-Working symbol.
✘□—□ ?	Printer Busy	The printer assigned to the display station is busy. The operator may either wait for the printer to become available or press the DvCnl key. If print requests were initiated by the Print key, DvCnl will cancel the request, remove the Device Busy symbol, and restore the keyboard. For host-initiated requests, DvCnl will cause Device Busy to be replaced by the Wait symbol, and a negative response will be sent to the host. If the Print key was used, it may be possible to select another printer.
✘□—□ ? ?	Printer Very Busy	This symbol applies only to operator-initiated requests with the Print key and means the same as Printer Busy, except that more time than usual is expected before the printer request is accepted. The symbol is displayed when the requested printer is assigned to the host as follows: 1. If ④ B or ⑥ B is displayed, the printer is in the In-Bracket (INB) state with a host PLU. 2. If ④ A or ⑥ A is displayed, a host Write, Erase/Write, or Copy command has been addressed to the printer, and the print operation has not yet been started by the host (by a command with the start-print bit on in the Write Control Character).
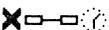
Figure 4-6 (Part 4 of 6). Do-Not-Enter Symbols

Symbol	Name	Explanation
✗✗	Operator Unauthorized	This symbol means that the printer requested by the operator is not authorized for the station. The Reset key should be pressed to restore the keyboard. This symbol appears when: • The Print key is pressed while the Printer Assignment columns of the Printer Status Field in the operator information area show no printer assignment or show question marks. • The Ident key is pressed on an IBM 3178 attached to an IBM 3274 when no printer is assigned. • During a printer ID entry mode, the operator enters a number that is in the printer authorization matrix but not authorized for the display station. • During a local-print operation started with the Print key, the "printer" assigned is actually a display station. This can occur if an invalid device description is loaded into the printer authorization matrix. • The print buffer is unable to store the contents of a display buffer (for example, when the display buffer is too large) during an operator-initiated local-copy operation.
✗←✗→	Go Elsewhere	An action that is invalid for the display surface location has been attempted. The Reset key should be pressed, and either the cursor should be moved or some other action should be taken. The Go Elsewhere symbol appears when: • An attempt has been made to enter, insert, erase, or delete a character when the cursor is in a protected field or at an attribute location. • An attempt has been made to use the Cursr Sel key when the cursor is not in a cursor-select field.
✗✗>	More Than	This symbol means that the operator has tried to enter too much information into a field. The Reset key should be pressed to restore the keyboard, the operation should be re-tried, and the entry should be corrected.
✗✗NUM	Numeric	This symbol appears in numeric lock operation. A nonnumeric entry was made at a display surface location reserved for numeric information. The Reset key should be pressed to restore the keyboard, and the operation should be re-tried. In the case of an IBM 3178 Model C3, the applicability of the numeric lock depends on the specified RPQ feature being installed in the IBM 3274/3276. The IBM 3178 Model C3 is not supported by the IBM 4321/4331 Processor.
✗✗#?	What Number	The operator has entered a number that is unacceptable at the display surface location. This message appears when a selected print ID is not numeric or is not in the matrix, or an incorrect entry is made in the test mode. The Reset key should be pressed to restore the keyboard and to make the correct entry.

Figure 4-6 (Part 5 of 6). Do-Not-Enter Symbols

Symbol	Name	Explanation
✕-S	Minus	The keyed symbol is not available. The Reset key should be pressed to restore the keyboard.
✕▫←⊠	Message Received	A message from the system operator (SSCP control program) was received and rejected. The Reset key should be pressed to restore the keyboard. This symbol appears only on an IBM 3178 attached to an IBM 3276 that uses SNA protocol.
✕⊀ ´ + ? ✕⊀ ` + ? ✕⊀ ^ + ? ✕⊀ ¨ + ? ✕⊀ ₅ + ?	Accent Plus What	These messages indicate that an invalid dead-key/character-key combination was entered (Canadian Bilingual French keyboard only). The reset key should be pressed to restore the keyboard, and a valid dead-key/character-key combination should be entered. Valid combinations are as follows:

```
`   à À è È ù Ù
´   é É
^   â Â ê Ê î Î ô Ô û Û
¨   ë Ë ï Ï ü Ü
,   ç Ç
```

For the Canadian Bilingual French keyboard, see Appendix F.

Figure 4-6 (Part 6 of 6). Do-Not-Enter Symbols

Reminders

Figure 4-7 explains the Reminder symbols that appear in locations 21 through 27 of the operator information area for the IBM 3274 and IBM 3276.

Symbol	Name	Explanation
↘⌐ℤ nn ↘⌐ℤ nnn	Communication Reminder	The communication link connecting the control unit to the system is producing errors. For descriptions of the error codes, refer to *IBM 3270 Information Display System: 3274 Control Unit Description and Programmer's Guide* (GA23-0061). The Communication Reminder symbol appears when: ● The control unit detects a permanent error condition in the connection to the host (attempts to re-try have ceased). In this case, the reminder symbol is sent to all stations attached to the control unit. ● In BSC mode, a line error is detected, causing the original contents of the display surface to be restored and a request for retransmission made to the host. In this case, the reminder symbol is sent only to the station affected.
▫←⊠	Reserved	This symbol (IBM 3178 attached to an IBM 3276 only) is reserved for future use and should be ignored if it is displayed. Pressing the Reset key restores the keyboard.

Figure 4-7. Reminder Symbols

Shifts and Modes

Figure 4-8 explains the Shift and Mode symbols that appear in locations 37 through 41 of the operator information area for the IBM 3274 and IBM 3276.

Symbol	Name	Explanation
⇧	Upshift	The keyboard is in the upshift state.
∧	Insert	The keyboard is in the insert mode. A character may be inserted at the cursor location. Characters beyond the cursor position move to make room for the inserted character.
NUM	Numeric	The keyboard is in numeric shift, which allows use of the 0 through 9 keys, the decimal sign, minus (-), and DUP keys only.

Figure 4-8. Shift and Mode Symbols

Printer Status

Figure 4-9 explains the Printer Status symbols that appear in locations 60 through 64 of the operator information area for the IBM 3274 and IBM 3276.

Symbol	Name	Explanation
□—□nn	Printer Assignment	The display station is authorized to use printer address number nn. Individual printers may be assigned address numbers 1 through 7 when attached to the IBM 3276, and 1 through 31 when attached to the IBM 3274. Valid printer classes are designated 70 through 85 for the IBM 3274.
□—□??	What Printer	The printer ID has changed. Pressing the Ident key causes a new printer assignment to be displayed.
□—■nn	Printer Printing	The printer identified by nn is printing information from the display station.
□—➤ nn	Printer Failure	The printer identified by nn has stopped while printing information from the display station. This symbol will remain on until: ● The operator clears the condition. ● The operator uses the DvCnl key following a printer-not-functional condition. ● Function management (FM) data is received from the host (SNA). ● Printer assignment is changed because power is applied to another printer (see IBM 3276 default printer authorization matrix).
□—□ – –	Assign Printer	When the operator changes the printer with the Ident key, the two printer ID numbers appear in the assignment columns, replacing the underlines.
(nothing displayed)		If a display station is attached to an IBM 3274 (4 is displayed in location 1), printing cannot take place. If the display station is attached to an IBM 3276 (6 is displayed in location 1), the operator can assign a printer with the Ident key.

Figure 4-9. Printer Status Symbols

4.3.5.2 Messages for the IBM 3178 Attached to the IBM 4321 and the IBM 4331

This section describes the information on the operator information area messages for the IBM 3178 when it is attached to the IBM 4321 and the IBM 4331.

Readiness and System Connection Symbols (locations 1 through 6)

Figure 4-10 explains the readiness and system-connection symbols that appear in locations 1 through 6 of the operator information area for the IBM 4331 with the Display/Printer Adapter.

Symbol	Name	Explanation
I	4321/4331 Ready	The Ready symbol is displayed in location 1 when the IBM 4321 or the IBM 4331 to which the IBM 3178 is attached is ready.
<u>A</u>	Online A	**Online A.** The Display/Printer Adapter is connected to the system under <u>A</u> rules.
TEST	Test	The display station is in test mode. Test mode is initiated or terminated by pressing the Test key while holding the Alt key. TEST is displayed in positions 3 through 6. Test procedures are described in the *IBM 3270 Information Display System, 3278 Display Station, Problem Determination Guide,* GA27-2839.

Figure 4-10. Readiness and System-Connection Symbols

Do-Not-Enter Messages

All these messages have an X in location 9 (Do-Not-Enter), with other symbols in locations 11 through 17 that define why the input is disabled. The keyboard does not lock mechanically, but character entry from the keyboard is inhibited and a change in the Click key (on to off, or off to on) indicates that the keyboard is disabled.

The Reset, SysRq, Attn, Test, DvCnl, Shift, AltCr, Cursr Blink, and Click keys are not disabled.

Pressing the Reset key will remove the Do-Not-Enter condition and restore the keyboard, except when the Time, Printer Busy, or Print-Not-Working symbol is displayed.

Figure 4-11 explains the Do-Not-Enter symbols that appear in locations 9 through 17 of the operator information area for the IBM 4321 and IBM 4331.

Symbol	Name	Explanation
X⟨⟩	Time	Time is required for the system to perform a function. This symbol is displayed due to:

1. A keyboard that has been locked by the host; for example, during a host-initiated print operation.

2. Internal processing constraints of the control unit.

Figure 4-11 (Part 1 of 2). Do-Not-Enter Symbols

Symbol	Name	Explanation

✗?+ **What?** The last input was not accepted. The What symbol appears when keystrokes are being held during an unsolicited write or buffer transfer, and the capacity of the queue is exceeded. (The queue is not processed in this case.)

Because of uncertainty about what was accepted, the operator should check the contents of the display surface before repeating the operation. In addition, if the Alt or a shift key was used, press the key again and then press Reset and re-try the operation.

✗⊂-f **Minus Function** Requested function not implemented in this controller.

✗⊶ **Security Key** The security key is turned off and no operator input can be accepted. When the key is turned on, this symbol disappears, but any other pre-existing Do-Not-Enter condition may then be displayed.

Pressing the Reset key does not remove the security key symbol. The Shift key, Alt Cursr Blink, Click key, associated symbols, and all other noninput disabled symbols will function when the security key symbol is displayed. The security key has priority over other input disabled symbols except when machine checks prevent communication between the control unit and the station.

✗←⅄→ **Go Elsewhere** An action has been attempted which is invalid for the display surface location. The Reset key should be pressed and either the cursor should be moved or some other action taken.

The Go Elsewhere symbol appears when an attempt is made to enter, insert, erase, or delete a character when the cursor is in a protected field or at an attribute location.

✗⅄> **More Than** This symbol means that the operator has attempted to enter too much information into a field. The Reset key should be pressed to restore the keyboard, and the operation should be re-tried and the entry corrected.

✗-S **Minus Symbol** The symbol keyed is not available. The Reset key should be pressed to restore the keyboard.

✗⅄´ + ? **Accent Plus What** These messages indicate that an invalid dead-key/character-key combination was entered (Canadian Bilingual French keyboard only).

✗⅄` + ?

✗⅄^ + ?

✗⅄¨ + ? The Reset key should be pressed to restore the keyboard, and a valid dead-key/ character-key combination should be entered. Valid combinations are as follows:

✗⅄ꜱ + ?

```
`   `  `  `  `  `  `
    à  À  è  È  ù  Ù
´   ´  ´
    é  É
^   ^  ^  ^  ^  ^  ^  ^  ^
    â  Â  ê  Ê  î  Î  ô  Ô  û  Û
¨   ¨  ¨  ¨  ¨  ¨
    ë  Ë  ï  Ï  ü  Ü
ꜱ   ꜱ  ꜱ
    ç  Ç
```

For the Canadian Bilingual French keyboard, see Appendix F.

Figure 4-11 (Part 2 of 2). Do-Not-Enter Symbols

Shifts and Modes

Figure 4-12 explains the Shift and Mode symbols that appear in locations 37 through 41 of the operator information area for the IBM 4321 and IBM 4331.

Symbol	Name	Explanation
⇧	Upshift	The keyboard is in upper shift.
∧	Insert	The keyboard is in insert mode. A character may be inserted at the cursor location. Characters beyond the cursor position move to make room for the inserted character.
NUM	Numeric	The keyboard is in numeric shift, which allows use of the 0 through 9 keys, the decimal sign, minus (-), and Dup keys only.

Figure 4-12. Shift and Mode Symbols

Printer Status

Figure 4-13 explains the Printer Status symbols that appear in locations 60 through 64 of the operator information area for the IBM 4321 and IBM 4331.

Symbol	Name	Explanation
□—□nn	Printer Assignment	The display station is authorized to use printer address number nn. Individual printers may be assigned address numbers 1 through 15.
		The number "nn" can be altered by Ident action or a reset (for instance IPL or Power On).
□—□ – –	Assign Printer	When the operator changes the assigned printer using the Print Ident key, the two numbers appear in the assignment columns, replacing the underlines.
□—■	Printer Printing	The printer is printing information from the display station.
✗□—□	Printer Busy	The printer assigned to the display station is busy. The operator may either wait for the printer to become available or press the DvCnl key. The DvCnl key will cancel the request, remove the Device Busy symbol, and restore the keyboard.
✗□—↘	Printer-Not-Working	The printer assigned to the display station is not functioning. If this symbol appears after the Print key was pressed, the DvCnl key should be pressed to restore the keyboard, cancel the request, and remove the Printer-Not-Working symbol. Restoration of the printer will not automatically remove the Printer-Not-Working symbol. If the Printer Printing symbol was displayed, the printer stopped during the last print operation.
		The display station indicator may precede a comparable indicator on the printer by as much as two minutes.
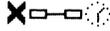
Figure 4-13. Printer Status Symbols

Chapter 5. Programming Considerations

As stated previously, the IBM 3178 can be used in the IBM 4300 Processor Complex and IBM 3270 Information Display System. This chapter has information about the programming support provided for the IBM 3178 by these systems. The reader should refer to the information for the IBM 3278 Model 2 in each referenced publication.

5.1 Processor Attachment

When used in the IBM 4300 Processor Complex, either IBM 3178 Model C1 or C2 can be attached, through a Display/Printer Adapter (DPA), to the IBM 4321/4331 Processor but the IBM 3178 Model C3 cannot be attached to the IBM 4321/4331 Processor through a DPA. The IBM 3178 works under the programs that support the IBM 4321/4331 Processors.

Information about preparing programs for the IBM 4321/4331 Processor and about host programming support can be found in the following publications:

- *IBM 4300 Processors' Principles of Operation for ECPS: VSE Mode:* GA22-7070

- *IBM 4331 Processor Functional Characteristics and Processor Complex Configurator,* GA33-1526

- *IBM 4331 Processor Display/Printer Adapter Component Description,* GA33-1536

5.2 Control Unit Attachment

When used in the IBM 3270 system, the IBM 3178 is attached to the IBM 3274 Control Unit or IBM 3276 Control Unit Display Station, and works under the programs that support the IBM 3270 system.

Information about preparing programs for the IBM 3270 systems and about host programming support is given in the following publications:

- *IBM 3270 IDS Data Stream Programmer's Reference,* GA23-0059

- *IBM 3270 Information Display System Reference Summary,* GX20-1878

- *IBM 3270 Information Display System Configurator,* GA27-2849

- *IBM 3270 Information Display System: 3274 Control Unit Description and Programmer's Guide,* GA23-0061

- *IBM 3270 Information Display System: 3276 Control Unit Display Station Description and Programmer's Guide,* GA18-2081

Appendix A. Installation Planning

The design and environmental requirements of the IBM 3178 enable it to be installed and set up in an office or computer room with a minimum number of special arrangements and without the help of an IBM service representative. This chapter describes the planning required for the installation.

Figure A-1 is a planning checklist for the IBM 3178. Determine the schedule dates for the events listed and enter them in the "Date" column.

Date	Event
	Identify the person who will be responsible for all phases of the planning and preparation.
	Review specifications for cables that may not be ordered from IBM, and begin to gather procurement source information.
	Review electrical requirements stated in this chapter.
	Make a site preparation plan. Prepare a floor plan showing the location of the IBM 3178. Consider the lengths of cables and power cords. (See Note.)
	Order cables from a contractor, if needed.
	Arrange for the installation of cables, power receptacles, wiring, etc.
	Define an employee training program, if necessary.
	Start the site preparation work according to the plan previously prepared.
	Complete the installation of cables, power receptacles, wiring, etc.
	Complete the site preparation.
	Make sure that the site preparation for the end connector of the IBM 3274/3276 Control Unit or IBM 4331 Processor and wiring has been completed.

Note: IBM provides templates of the IBM 3178. Appendix C shows the printed physical planning templates. For use in the U.S. and Canada, these templates are drawn to a scale of 2cm = 1m (1/4 inch = 1 foot).

Figure A-1. Planning Checklist for IBM 3178

One of the most important tasks when planning for the installation of an IBM 3178 is the preparation of a detailed floor plan that shows station placement for each location. Consideration must be given to efficient work flow, operator comfort and safety, and the following:

- Electrical requirements
- Communication interface to the control unit
- Cable paths
- Operator workspace
- Lighting
- Viewing distance
- Electromagnetic influences
- Electrostatic discharge
- Lightning protection
- Safety considerations

A.1 Electrical Requirements

A.1.1 Input Power

Input power requirements for the U.S. and Canada are as follows:

- 0.08 kVA (maximum)
- Single-phase
- 50 or 60 Hz
- 0.8 A (maximum)
- 90 to 137 Vac
- A 1.8-m (6-ft) power cord
- Nonlocking plug type (see Figure A-2)

A.1.2 Power Cord and Receptacle

CAUTION: The power attachment cable plug (when supplied) is approved for use with this product and meets the relevant testing laboratory, country, or test-house standards. For the user's 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 product. The customer is responsible for receptacle wiring.

The IBM 3178 has a 1.8-m (6-ft), 3-wire, power cord that includes an equipment grounding wire (green, or green and yellow). For safety purposes, each branch circuit must be grounded. A dedicated wire conductor or a continuous metal conduit may be used to ground the equipment. In all cases, the ground must be routed to earth, or to a suitable building ground that is routed to earth.

Figure A-2 identifies the matching receptacle or connector for the U.S. and Canada that you must supply. For countries other than the U.S. and Canada, see Appendixes E and F.

Nonlocking Plug and Receptacle

15 Amperes		
	Receptacle	Plug
125 V	⌒ G 〇 〇W 5-15R	● G W● ● 5-15P
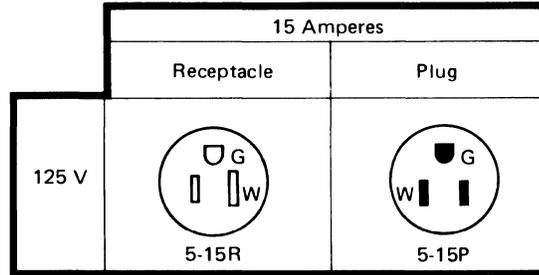
Figure A-2. Power Plug and Receptacle

A.2 Communication Interface to the Control Unit

The coaxial interface cable (RG62AU for indoor installation and RG62AU modified for outdoor installation) connects the IBM 3178 directly to the control unit, and must be installed and tested before delivery of the IBM 3178. The length of the cable is variable, up to 1500 m (4,920 ft).

The signal cable is not shipped with the IBM 3178. The responsibility for obtaining, installing, and maintaining the cable is the IBM 3178 user's. Components or preassembled cables are available from IBM. When you order or install coaxial cable, you should refer to the *Installation Assembly of Coaxial Cable and Accessories to IBM Products,* GA27-2805. Also refer to the installation planning information for the control unit to which the printer will be attached.

Figure A-3 shows the BNC type connector used for the coaxial interface cable. The coaxial interface cable with this type of connector may be purchased from IBM or a customer-selected source. Two types of cable assemblies can be ordered from IBM: 2577672 for the indoor installation and 1833108 for the outdoor installation. For details about the specification of each cable assembly, refer to *IBM 3270 Information Display System Installation Manual–Physical Planning,* GA27-2787.

Figure A-3. BNC-Type Connector for a Coaxial Interface Cable

A.3 Cable Paths

The paths of cables exiting from the IBM 3178 should be shown on the floor plan, with consideration given to the protection of cables, as well as the hazard these cables create by being on the floor. For information about the outdoor installation of the cable, refer to Appendix B.

A.4 Operator Workspace

Following are the recommended dimensions or positions for planning work-station layouts:

- Distance between operators: 122 cm to 152 cm (48 in. to 60 in.) preferred

- Leg clearance while seated, minimum:

  - Width : 61 cm (24 in.)
  - Depth : 46 cm (18 in.)
  - Height: 64 cm (25 in.)

- Toe clearance for standing: 10 cm (4 in.) minimum

- See-over height (top of display unit to floor):

  - Standing operator: 140 cm (55 in.) maximum
  - Seated operator: 100 to 110 cm (40 to 43 in.)

- Writing surface:

  - 41 cm (16 in.) deep by 30 cm (12 in.) wide, minimum
  - Allow 2.5 cm (1 in.) space between multiple sets of documents

A.5 Ambient Lighting

Average lighting of 540 to 810 lumens/meter^2 (50 to 75 footcandles) is recommended for most tasks requiring displays, and it should be evenly distributed over the work area. The intensity of the light can be measured by a common luminance meter.

A.6 Viewing Distance

Most operators will find that they can view the display surface comfortably at a distance of 33 to 51 cm (13 to 20 in.). This distance, of course, will depend on the individual's eyesight, visual conditions, work-station layout, and features of the reference or source material.

A.7 Electromagnetic Influences

In some cases, the site chosen for an IBM 3178 installation may have ambient electromagnetic fields. These fields can result from nearby radio-frequency sources, such as transmitting antennas (AM, FM, television, and two-way radios), radar installations, or industrial equipment (radio-frequency induction heaters, arc welders, and insulation testers). Three-phase power distribution lines can also generate magnetic fields that may cause display problems.

Other magnetic sources include transformers, distribution panels, rotating machinery, and electric floor heaters. To identify the location of such magnetic sources, check with your building engineer. As a precautionary measure, the IBM 3178s should be kept as far as possible from such magnetic sources.

A planning review may be appropriate to evaluate the conditions and to determine whether any special installation or product considerations are required to ensure normal system operation and maintenance.

A.8 Electrostatic Discharge

High electrostatic charges can build up on people and furniture as a result of contact with floor and furniture coverings. Discharge of these static charges to the metal of the unit, or to the furniture on which it is placed, may cause interference with the operation of electronic equipment. It may also cause personal discomfort if discharged to other people. Some major factors that contribute to this problem are:

- High-resistance floor-surface material
- Carpeting without antistatic properties
- Plastic seat coverings
- Very low humidity
- Metal-frame furniture

A.9 Lightning Protection

The installation of lightning protection for your secondary power source should be planned when:

- Primary power is supplied by an overhead power service.
- The utility company installs lightning protectors on the primary power source.
- The area is subject to electrical storms or equivalent types of power surges.

Also see Appendix B for information about lightning protection for the communication interface cable.

A.10 Product and Environmental Safety

Environmental safety is the responsibility of the user. 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 (see the machine specification pages in this chapter for recommended clearances). Access clearance for each machine must also be considered.

- Grounding of branch circuits.

- Lightning protection for power lines and for signal lines.

The installation must meet local and national code requirements.

Appendix B. Lightning Protection

B.1 Cable Installation

Because some areas are more susceptible to lightning activity than other areas, the precautions that must be taken vary with each installation. Following are suggested methods for installing outdoor cables in areas with varying degrees of exposure to lightning. In all cases, station protectors are required at both ends of the cable as described under "Station Lightning Protectors" in this Appendix.

B.1.1 Areas with Low Lightning Exposure

B.1.1.1 Aerial Installation

Because the coaxial cable is not self-supporting, it must be attached to the messenger (support) wire at least every 3.05 m (10 ft) (See Figure B-1). Ground the messenger wire at both ends in accordance with the instructions given under "Station Lightning Protectors."
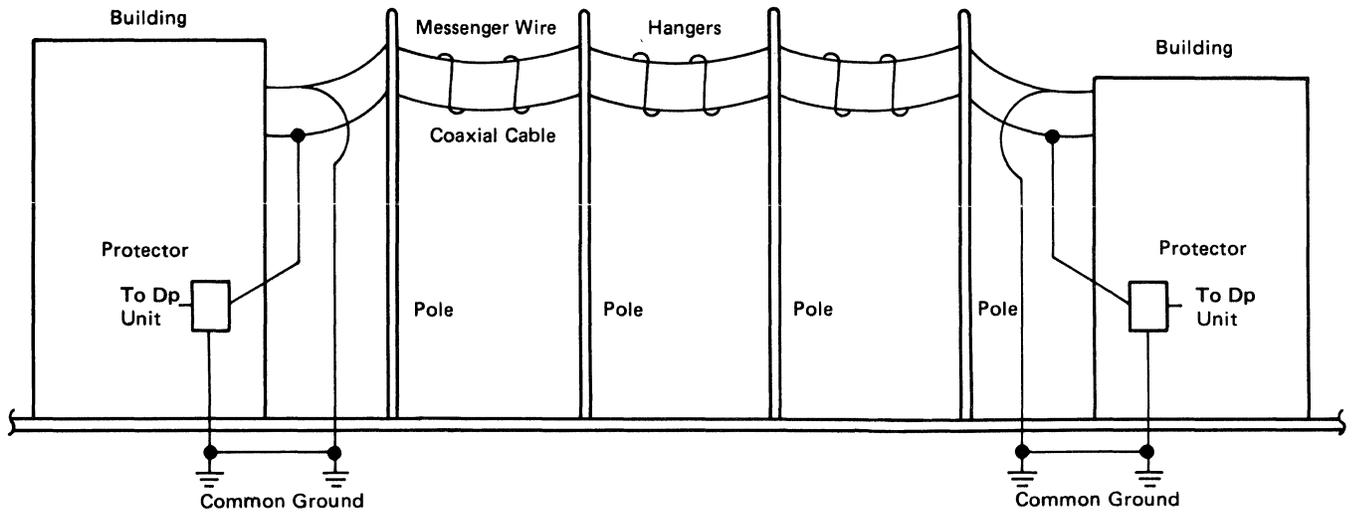
Figure B-1. Low-Lightning-Exposure Area — Aerial Installation

B.1.1.2 Buried Installation

Bury the cable well below the frost line to prevent upheaval.

B.1.2 Areas with Medium Lightning Exposure

B.1.2.1 Aerial Installation

As shown in Figure B-2, install the coaxial cable and supporting messenger wire at least 1 m (39 in.) below a shield line. Both the shield line and the messenger wire must be grounded at each pole and at each end with No. 6 AWG copper wire. The ground resistance at each pole should not exceed 10 ohms. A grounding rod driven into the earth a minimum of 2.7 m (9 ft) is the minimum requirement. Both ends of the messenger wire and shield line should be grounded in accordance with the instructions given under "Station Lightning Protectors."
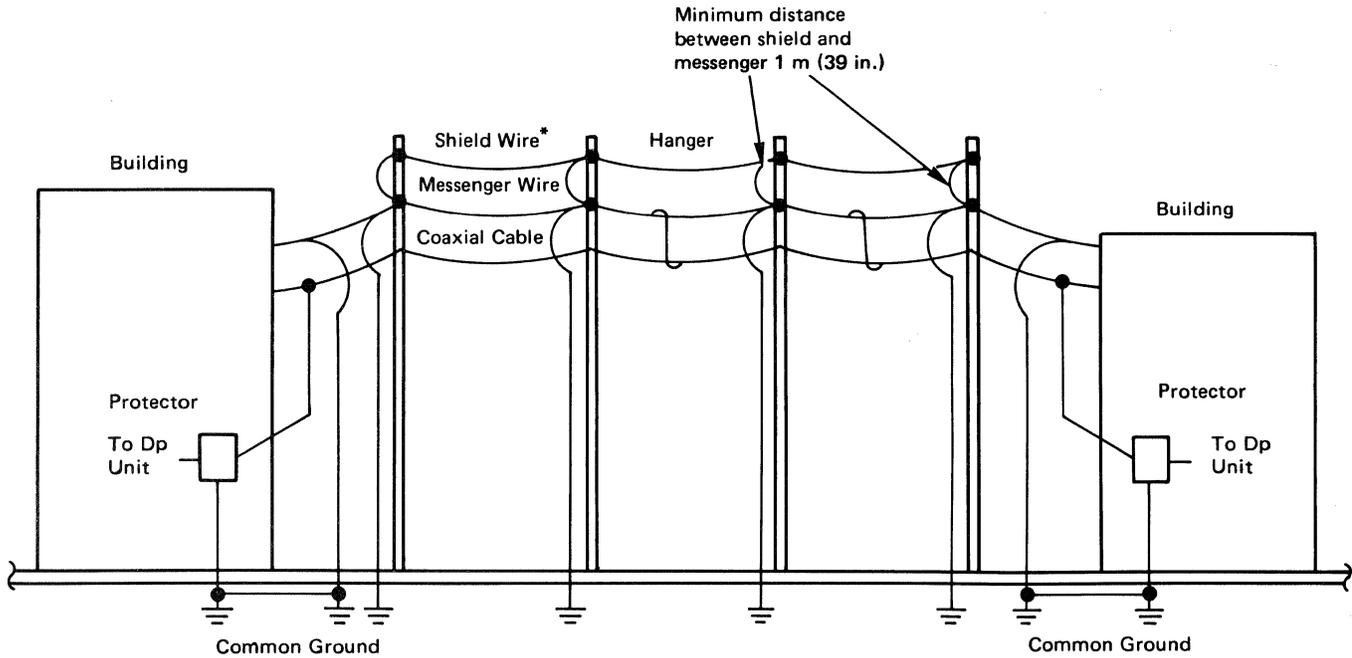
*Power lines can provide shielding. When the cable is run jointly with the power line, the messenger wire should be bonded to the multiground neutral (MGN). The MGN can be used in lieu of an earth-driven grounding rod. Bond all ground points to the power company multiground neutral.

Figure B-2. Medium-Lightning Exposure Area—Aerial Installation

B.1.2.2 Buried Installation

Provide adequate protection, and bury the cable with two shield wires installed above the coaxial cable. The horizontal spacing between the shield wires should be between 46 cm (18 in.) and 61 cm (24 in.). The two shield wires should be approximately 61 cm (2 ft) above the cable and buried below the frost line. The shield wire should be No. 6 AWG (or larger) copper wire. The cable should be centered between the two shield wires as shown in Figure B-3.

Below frost line

0.457 m - 0.61 m
(18-24 in.)

0.61 m
(2 ft)

Two shield wires
13.3 mm² (0.02 in.²)
(6 AWG) bare copper
buried below the frost
line.

Cable midway
between the two
shield wires and
0.61 m (2 ft) below
the shield wires.
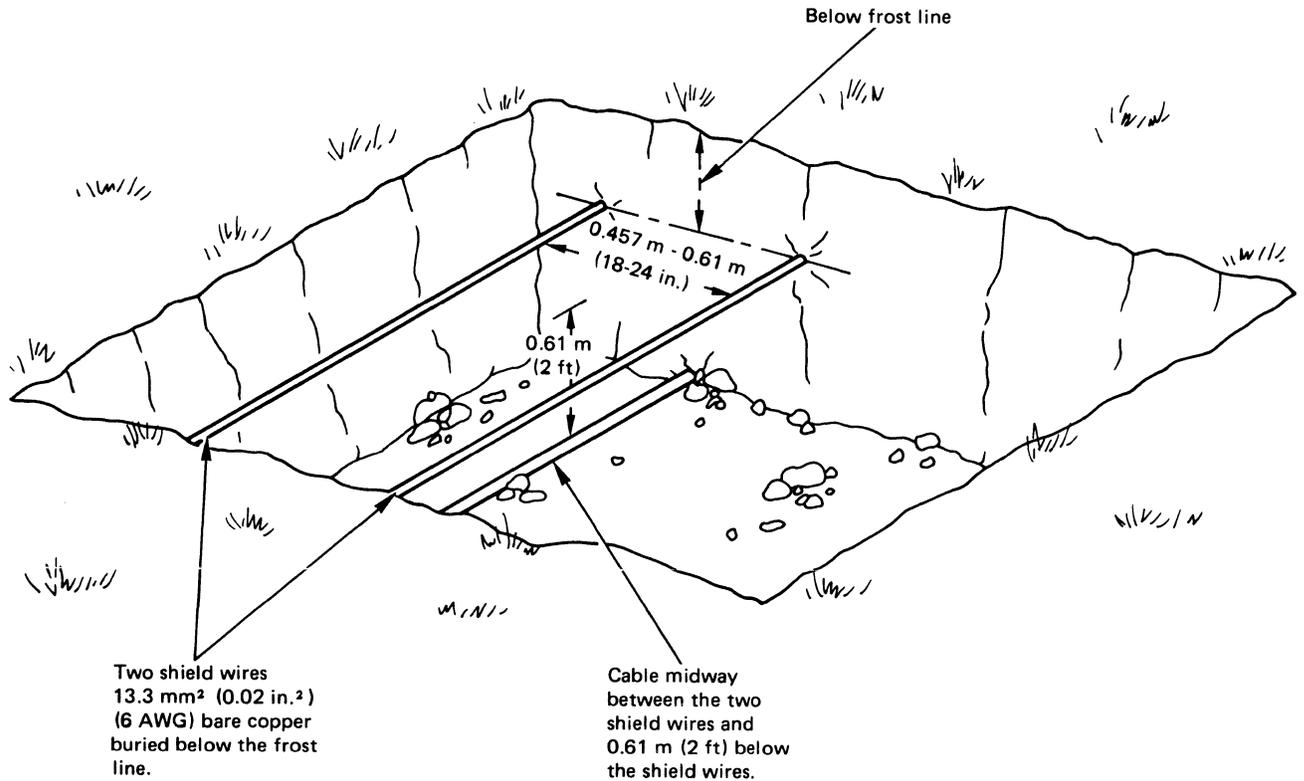
Figure B-3. Medium-Lightning Exposure Area—Buried Installation

B.1.3 Areas with High Lightning Exposure

B.1.3.1 Aerial Installation

The recommendations for aerial installation in areas with medium lightning exposure also apply to areas with high lightning exposure. When ground resistivity is high, run a parallel buried ground wire (counterpoise) below the frost line. In addition, provide pole protection wires on each nonmetallic pole. Fasten a No. 6 AWG (or larger) copper wire to the pole from top to bottom. This wire can also act as the grounding wire for the shield line and messenger wire. The counterpoise, if used, should have all pole grounds attached to it and be commoned to the grounding system used for the building. See Figure B-4.
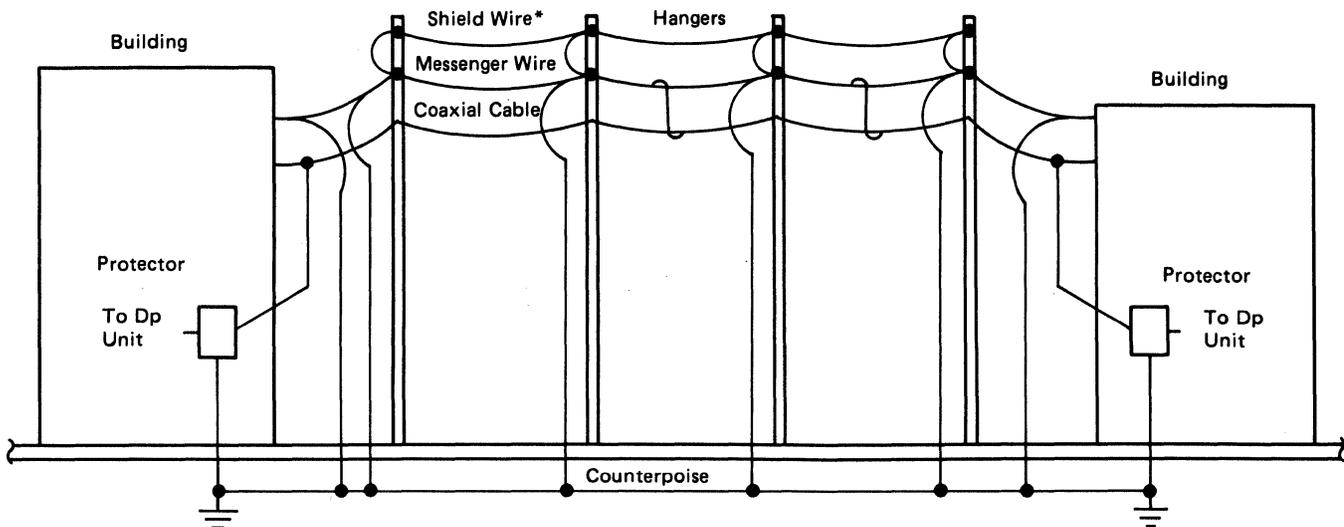
*Power lines can provide shielding. When the cable is run jointly with the power line, the messenger wire should be bonded to the multiground neutral (MGN). The MGN can be used in lieu of an earth-driven grounding rod. Bond all ground points to the power company multiground neutral.

Figure B-4. High-Lightning-Exposure Area — Aerial Installation

B.1.3.2 Buried Installation

Run the cable in a metal conduit buried below the frost line. Generally, routing buried or aerial cables through the highest points of the local terrain, which are subject to increased lightning activity, should be avoided.

B.2 Station Lightning Protectors

To help protect personnel and minimize damage to IBM equipment from sudden surges of lightning energy, a station protector must be attached to the shield at each end of each coaxial cable that is routed outdoors. This is true for both overhead and buried cable runs.

The station protector obtained from IBM must be installed indoors. (The protector is designed for inside installation only.) The protector should be installed at the point at which the cable enters or exits from the building and should be as close to suitable ground as practical.

The protector must be grounded. The minimum recommended gauge of the grounding conductor is 12 AWG [2.05 mm (0.08 in.) in diameter]. The grounding conductor should be routed to the grounding electrode in as straight a line as practical and should not exceed 3.05 m (10 ft) in length. *Longer runs will require ground wires with proportionately larger diameters.*

The following are the various types of grounding electrodes, in the preferred sequence:

1. Public metallic water pipe system. [Any metallic water pipe system will suffice, if at least 3.05 m (10 ft) is in moist earth.]

2. Power service conduit, service-equipment enclosure, or building steel. (Usually when a metallic water pipe system is not available, the grounding system used by the power utility is the best available ground.)

3. Other grounding electrodes approved by local and national codes; for example, N.E.C. 800-31.

4. The grounding rod electrode is the least preferable, because rods driven into anything other than very moist earth (in a water table) have been known to have a resistance of several hundred ohms.

All grounds should be commoned at one location (National Fire Protection Code). Common grounding is recognized as the most effective method of preventing *side flashes* resulting from a lightning discharge. The conductors used for bonding and interconnecting these grounds should be at least No. 6 AWG, 4.1-mm copper wire (lightning-protection code NFPA-78).

Lightning protectors should not be installed in areas where unauthorized personnel may come in contact with them. They should not be installed, have maintenance performed on, be connected or disconnected, or be handled in any way during periods of lightning activity; this also applies to the coaxial cable that runs from the protector to the station. The protectors should be installed so that access can be readily gained for maintenance and replacement of the elements. The area of the building at which the cables enter or leave must neither contain combustible material nor be considered a hazardous area.

Surge protectors vary in initial cost, maintenance cost, stability, useful life, and fail-safe protection. You must decide which type of protector best meets your needs. For reliability and lower maintenance costs, the *Rural Electrification Administration Telephone Engineering and Construction Manual,* Section 823, Issue #2, dated January 1976, recommends the use of gas-type protectors in the following situations:

- On all types of high-priority circuits where continuity of service is important and only the minimum outage time can be permitted (such as for fire-alarm circuits, interoffice or EAS trunk circuits, and data circuits).

- On all carrier circuits where lightning incidence is significant.

- For all subscriber station protectors in areas with a record of high station-protection maintenance costs with carbon blocks, or of plant or equipment damage due to lightning surges or power-fault current-induced surges.

- For all main-frame protectors in unattended central offices located in areas with a record of high protector maintenance or equipment failures caused by lightning or power-fault current-induced surges.

At present, only the gas-tube type protector is available from IBM.

The following protector and attachment kits (see Figure B-5) may be ordered from IBM on a miscellaneous equipment specification (MES) form:

- *Protector Kit (IBM PN 1830818):* Has two gas-element station protectors, one for each end of the cable run.

- *Attachment Kit (IBM PN 1833106):* Has the parts necessary for attaching a station protector to two coaxial cable ends. An attachment kit is needed for each coaxial cable.

Each station protector can handle two coaxial cables. Therefore, if two cables are routed between the same two points, only one station protector kit is required, but two attachment kits are necessary. Refer to *Installation Assembly of Coaxial Cable and Accessories for Attachment to IBM Products,* GA27-2805, for details about attachment methods.

The Gas Protector Unit, IBM PN 5252899 (Reliable Electric 1304 FSR), is a replacement for the Gas-Element Station Protector, formerly IBM PN 5252772 (Reliable Electric 1304). Simply unscrew the carbon element and screw in the gas element. Care should be taken not to spill the contents.

IBM Part Number	Part Description	Quantity	Commercial Source
1830818 Includes the following:	Kit for gas-element station protectors	1	IBM
5252895	Station protector	2	Reliable Electric Co. R-123 FSR or other equivalent customer-selected source
5252899	Gas protector unit (replaceable item for the gas-element station protector)	4	Reliable Electric Co. 1304-FSR or other equivalent customer-selected source
1833106 Includes the following:	Kit for attaching the station protectors	1	IBM
5252764	Adapter BNC Bulkhead UG-492A/U	2	Amphenol Corporation 31-220 or other equivalent customer-selected source
1833107	Jumper assembly The following parts compose PN 1833107:	2	IBM
	Ring terminal, 12.7-mm (0.500-in.) stud-wire range 14-16	1	Electrical Supplier
	Ring terminal 10 stud-wire range 14-16	1	Electrical Supplier
	Wire-green/yellow 14 AWG (250.8 mm)	1	Electrical Supplier

Note: The gas protector unit (PN 5252899) can recover repeatedly from momentary transient voltages. Sustained high current will cause the arrester to ground the circuit permanently. When this occurs, the gas protector unit must be replaced.

Figure B-5. Summary of Station Protectors

Appendix C. Physical Planning Template

The following template shows the plain view of the IBM 3178 station and its required service clearance (see Chapter 2, "Physical Dimensions," for more details about the service clearance). It may help you plan the layout of your office.

Keyboard Element   Video Element

Front

Service Area Boundary   Logic Element
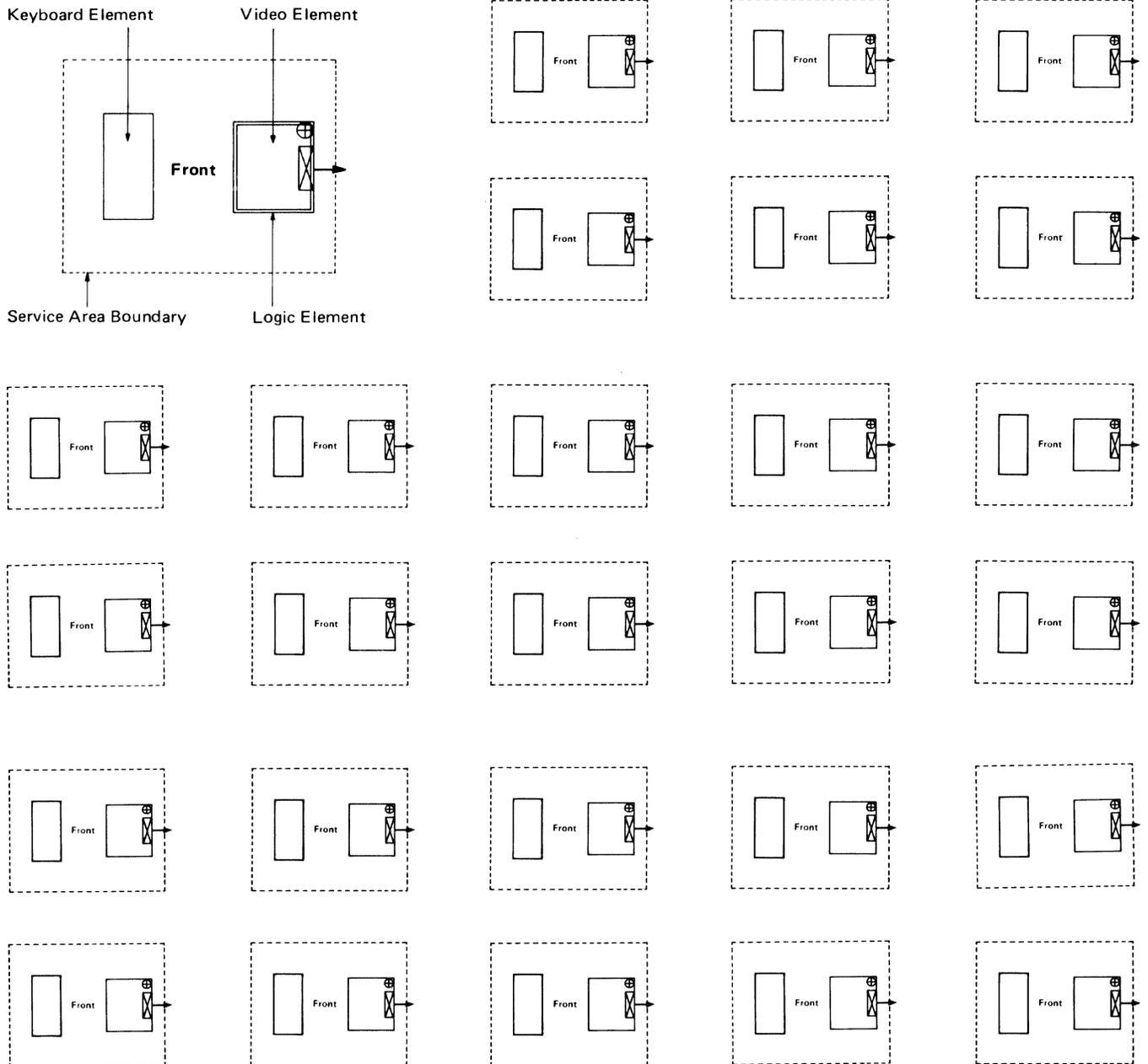
Scale: 2 cm = 1 m (¼ inch = 1 foot)

⊠ : Cable Exit Area
⊕ : Power Cord Exit

Appendix D. U.S. EBCDIC I/O Interface Codes

Figure D-1 shows the U.S. EBCDIC I/O interface codes for the IBM 3178 Keyboard used with the IBM 3274 Control Unit, the IBM 3276 Control Unit Display Station, and the IBM 4321/4331 Processor with a Display/Printer Adapter.

Hex 1 / Bits 4567	00				01				10				11				Bits 0,1
	00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	Bits 2,3
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	Hex 0
0000 0	NUL				SP	&	-						{	}	\	0	
0001 1		SBA					/		a	j	~		A	J		1	
0010 2		EUA							b	k	s		B	K	S	2	
0011 3		IC							c	l	t		C	L	T	3	
0100 4									d	m	u		D	M	U	4	
0101 5	PT	NL							e	n	v		E	N	V	5	
0110 6									f	o	w		F	O	W	6	
0111 7									g	p	x		G	P	X	7	
1000 8									h	q	y		H	Q	Y	8	
1001 9		EM						`	i	r·	z		I	R	Z	9	
1010 A					¢	!	¦	:									
1011 B					.	$	,	#									
1100 C	FF	DUP		RA	<	*	%	@									
1101 D	CR	SF			(	)	_	'									
1110 E		FM			+	;	>	=									
1111 F				SUB	|	¬	?	"									

Legend:

CR	Carriage Return Code	NL	New Line Code
DUP	Duplicate Character Code	NUL	Null Character Code
EM	End-of-Message Printer Control Character	PT	Program Tab Order Code
		RA	Repeat to Address Order Code
EUA	Erase Unprotected to Address Order Code	SBA	Set Buffer Address Order Code
		SF	Start Field Order Code
FF	Form Feed Printer Control Character	SP	Space Character
		SUB	Substitute Character (Error Override)
FM	Field Mark Character		
IC	Insert Cursor Order Code		

Figure D-1. U.S. EBCDIC I/O Interface Codes

Appendix E. Information for Europe, the Middle East, and Africa

This appendix describes the input/output (I/O) interface codes and keyboard layouts for the various languages supported by the IBM 3178. Also included are the electrical requirements for each country.

E.1 I/O Interface Codes

The IBM 3178 supports I/O interface codes for the following languages:

- Europe, the Middle East, and Africa

  - Austrian/German

  - Belgian

  - Danish

  - French (AZERTY)

  - French (QWERTY)

  - Italian

  - Norwegian

  - Portuguese

  - Spanish

  - Swedish

  - Swiss-Bilingual German

  - Swiss-Bilingual French

  - U.K. English

  - U.S. English

Figure E-1 shows the standard EBCDIC I/O interface codes for the IBM 3178 Keyboard used with the IBM 3274 Control Unit, the IBM 3276 Control Unit Display Station, and the IBM 4321/4331 Processor with a Display/Printer Adapter. Figure E-2 shows the Swiss I/O interface codes. Also included is Figure E-3, which shows the differences in I/O interface codes for the various national languages supported by the IBM 3270 Information System or IBM 4321/4331 Processor with the Display/Printer Adapter.

Bits 4567	Hex 1	00				01				10				11				Bits 0,1 / 2,3
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	Bits 2,3
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	Hex 0
0000	0	NUL				SP	&	.						NU10	NU11	NU12	0	
0001	1		SBA					/		a	j	NU9		A	J		1	
0010	2		EUA							b	k	s		B	K	S	2	
0011	3		IC							c	l	t		C	L	T	3	
0100	4									d	m	u		D	M	U	4	
0101	5	PT	NL							e	n	v		E	N	V	5	
0110	6									f	o	w		F	O	W	6	
0111	7									g	p	x		G	P	X	7	
1000	8									h	q	y		H	Q	Y	8	
1001	9		EM						NU4	i	r	z		I	R	Z	9	
1010	A					NU1	NU2	NU3	:									
1011	B					.	NU5	,	NU6									
1100	C	FF	DUP		RA	<	*	%	NU7									
1101	D	CR	SF			(	)	_	'									
1110	E		FM			+	;	>	=									
1111	F				SUB	NU13	NU8	?	NU14									

Legend:

CR   Carriage Return Code
DUP   Duplicate Character Code
EM   End-of-Message Printer Control Character
EUA   Erase Unprotected to Address Order Code
FF   Form Feed Printer Control Character
FM   Field Mark Character
IC   Insert Cursor Order Code

NL   New Line Code
NUL   Null Character Code
NU1 through NU14   National Use Characters
PT   Program Tab Order Code
RA   Repeat to Address Order Code
SBA   Set Buffer Address Order Code
SF   Start Field Order Code
SP   Space Character
SUB   Substitute Character (Error Override)

Note: National use (NU) character differences are shown in Figure E-3.

Figure E-1. Standard I/O Interface Codes for EBCDIC

Hex 1 / Bits 4567	Hex 0	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0000	0	NUL				SP	&	-						{	}	\	0
0001	1		SBA				é	/		a	j	~	£	A	J		1
0010	2		EUA			â	ê			b	k	s		B	K	S	2
0011	3		IC			ä	ë	Ä		c	l	t		C	L	T	3
0100	4					à	è			d	m	u		D	M	U	4
0101	5	PT	NL							e	n	v		E	N	V	5
0110	6						î			f	o	w		F	O	W	6
0111	7						ï			g	p	x		G	P	X	7
1000	8					ç	ì			h	q	y		H	Q	Y	8
1001	9		EM						`	i	r	z		I	R	Z	9
1010	A					[	]	¦	:								
1011	B					.	$	,	#					ô	û		
1100	C	FF	DUP		RA	<	*	%	@					ö	ü	Ö	Ü
1101	D	CR	SF			(	)	_	'				¨	ò	ù		
1110	E		FM			+	;	>	=								
1111	F				SUB	!	^	?	‖								

Bits 0, 1 ← 00 01 10 11
Bits 2, 3 ← 00 01 10 11 (per group)
Hex 0 ← 0 1 2 3 4 5 6 7 8 9 A B C D E F

Legend:

CR	Carriage Return Code
DUP	Duplicate Character Code
EM	End-of-Message Printer Control Character
EUA	Erase Unprotected to Address Order Code
FF	Form Feed Printer Control Character
FM	Field Mark Character
IC	Insert Cursor Order Code
NL	New Line Code
NUL	Null Character Code
PT	Program Tab Order Code
RA	Repeat to Address Order Code
SBA	Set Buffer Address Order Code
SF	Start Field Order Code
SP	Space Character
SUB	Substitute Character (Error Override)

Figure E-2. Swiss EBCDIC I/O Interface Codes

National Use Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
I/O Hex Code	4A	5A	6A	79	5B	7B	7C	5F	A1	C0	D0	E0	4F	7F
Controller Language Device														
U.S. EBCDIC	¢	!	¦	`	$	#	@	¬	~	{	}	\	|	"
Austrian/German	Ä	Ü	ö	`	$	#	§	^	β	ä	ü	Ö	!	"
Belgian	[	]	ù	`	$	#	à	^	··	é	è	ç	!	"
Danish/Norwegian	#	¤	ø	`	Å	Æ	Ø	^	ü	æ	å	\	!	"
French	°	§	ù	`	$	£	à	^	··	é	è	ç	!	"
Italian	°	é	ò	ú	$	£	§	^	ì	à	è	ç	!	"
Portuguese	[	]	õ	'	$	Ã	Õ	^	ç	ã	/	ç	!	"
Spanish	[	]	ñ	`	Pts	Ñ	@	¬	··	{	}	\	|	"
Swedish	§	¤	ö	é	Å	Ä	Ö	^	ü	ä	å	É	!	"
U.K.	$	!	¦	'	£	#	@	¬	‾	{	}	\	|	"

Figure E-3. National Use (NU) Differences for I/O Interface Codes

E.2 Keyboard Layouts

Figures E-4 through E-16 show the keyboard layouts for the languages of Europe, the Middle East, and Africa.

75-Key Keyboard
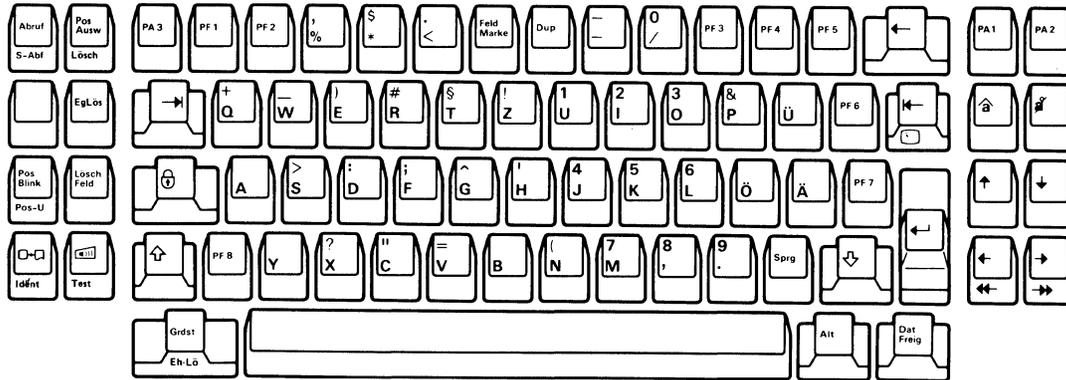
87-Key Keyboard
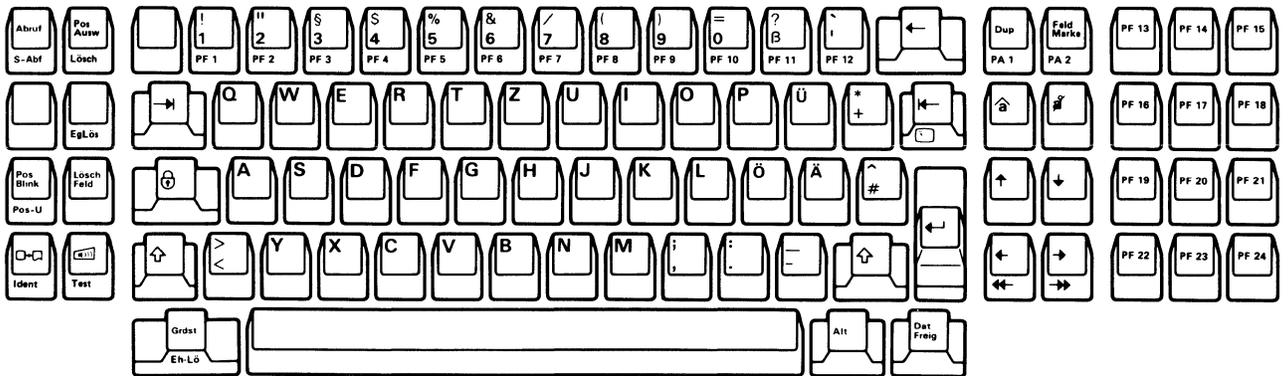
Figure E-4. Keyboard Layouts—Austrian and German

75-Key Keyboard
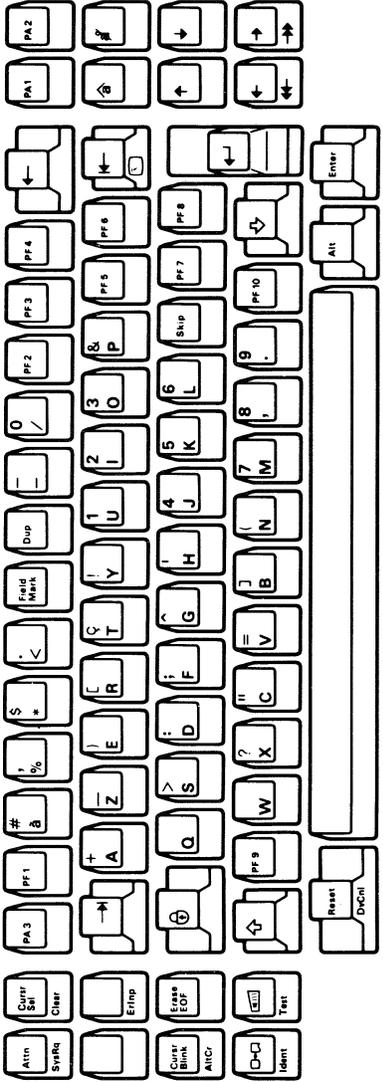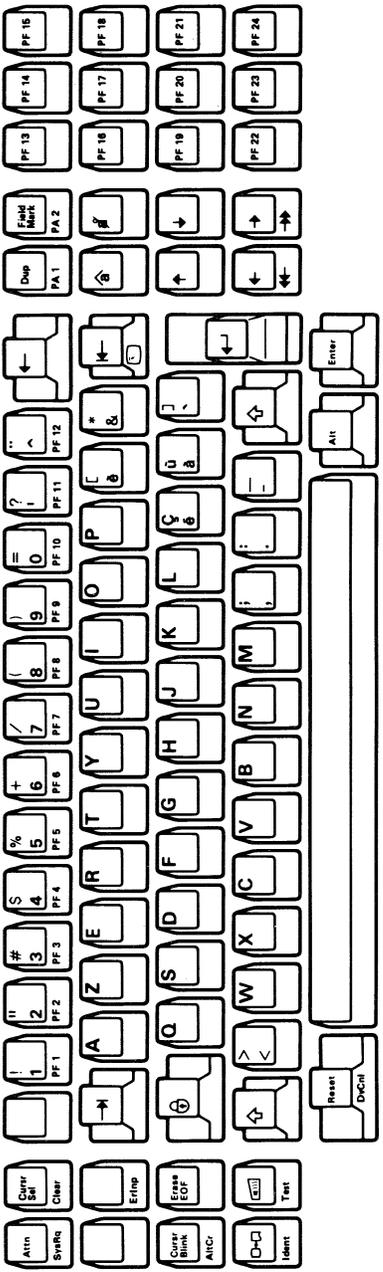
87-Key Keyboard

Figure E-5. Keyboard Layouts—Belgian

75-Key Keyboard
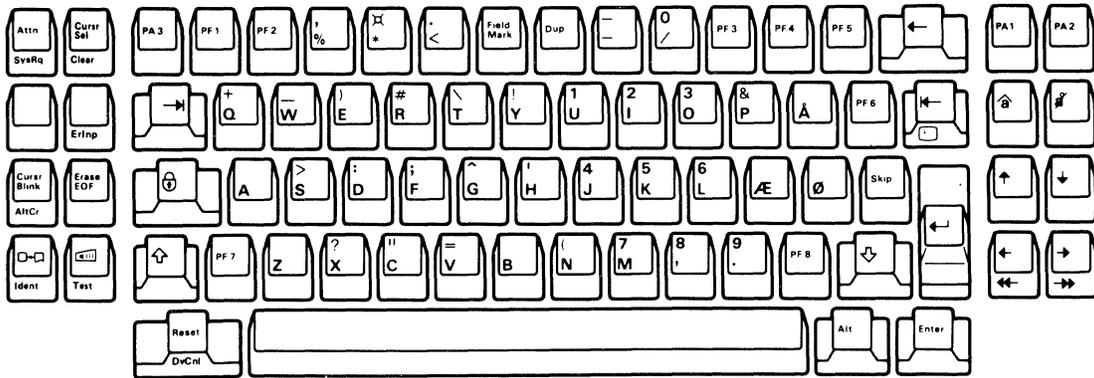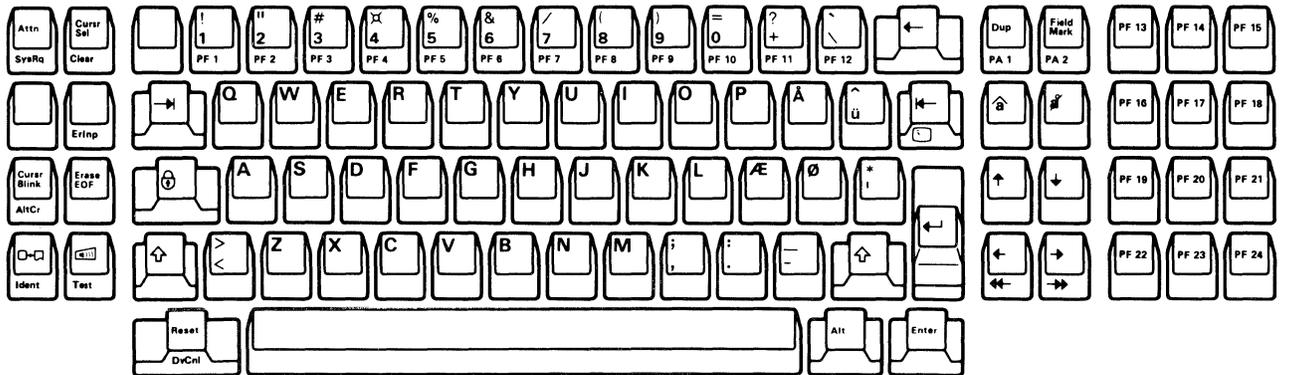
87-Key Keyboard

Figure E-6. Keyboard Layouts—Danish

75-Key Keyboard
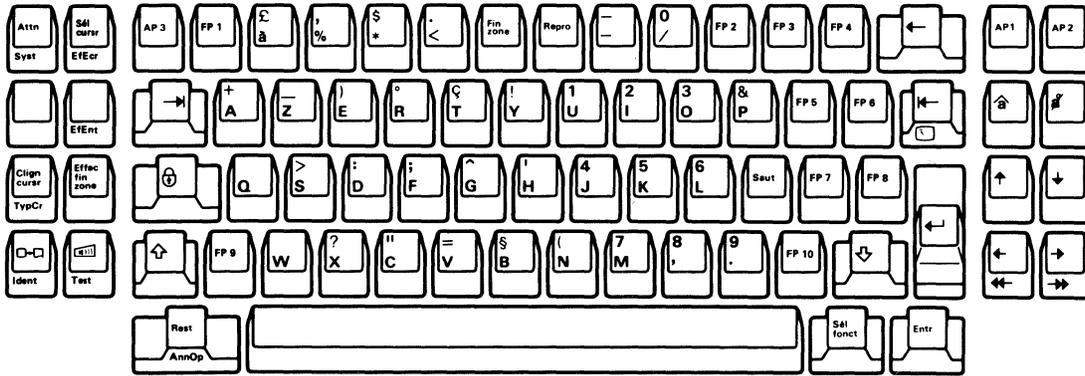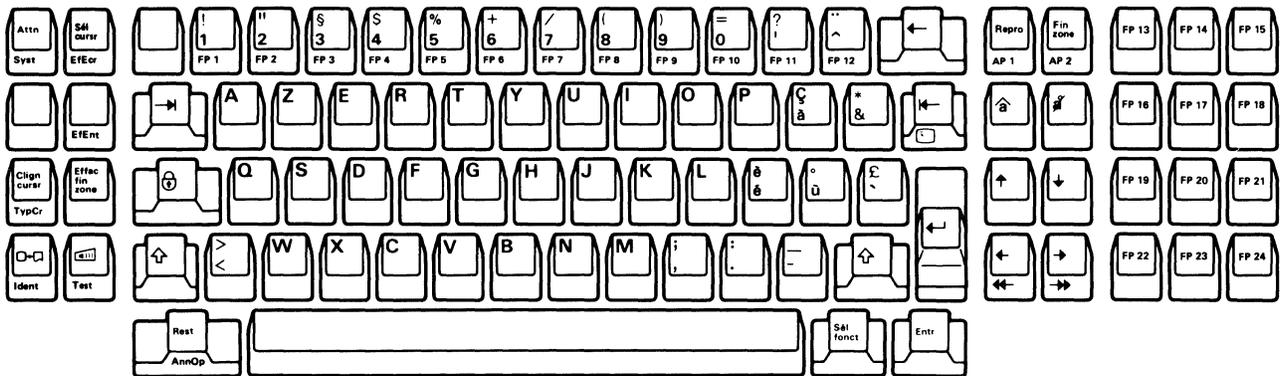
87-Key Keyboard

Figure E-7. Keyboard Layouts—French (AZERTY)

75-Key Keyboard
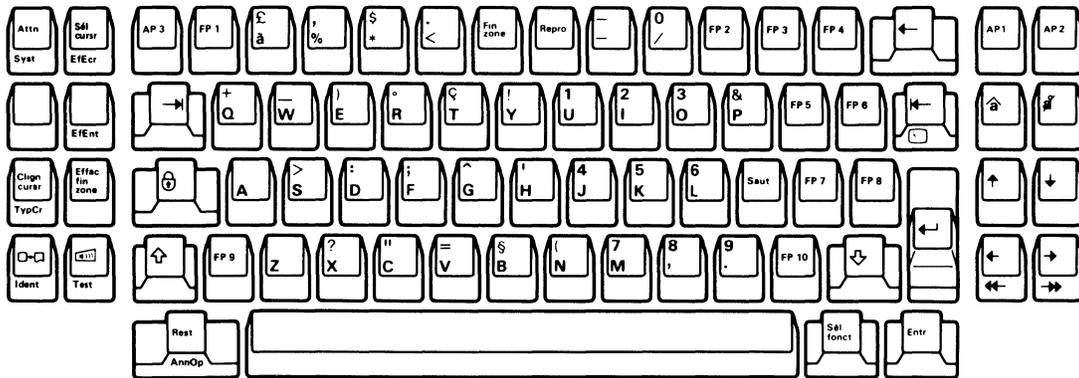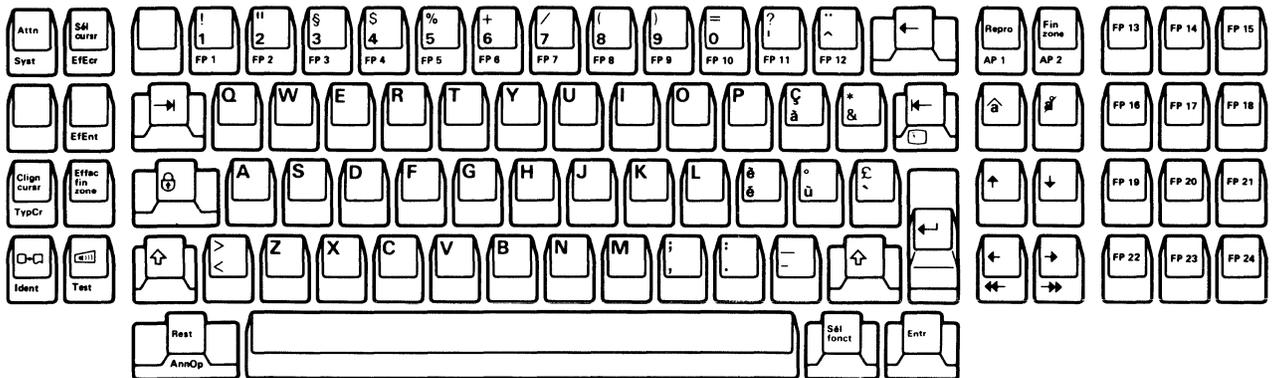
87-Key Keyboard

Figure E-8. Keyboard Layouts—French (QWERTY)

75-Key Keyboard
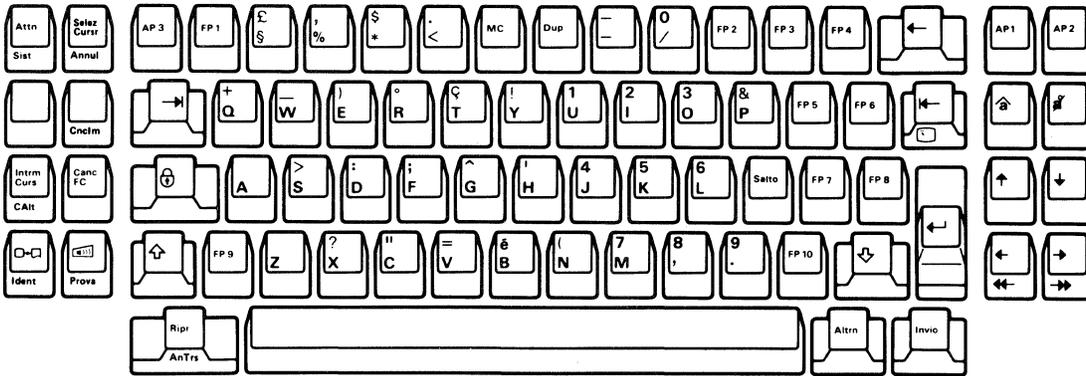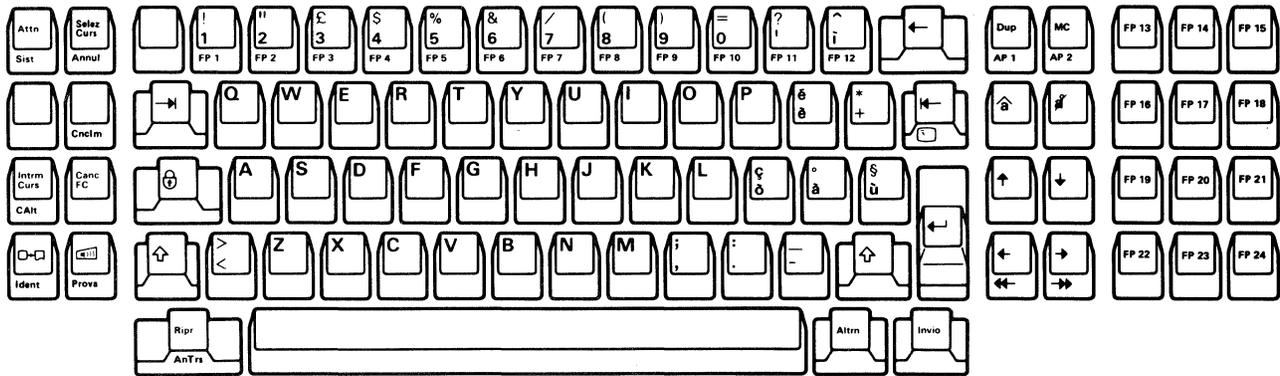
87-Key Keyboard

Figure E-9. Keyboard Layouts–Italian

75-Key Keyboard
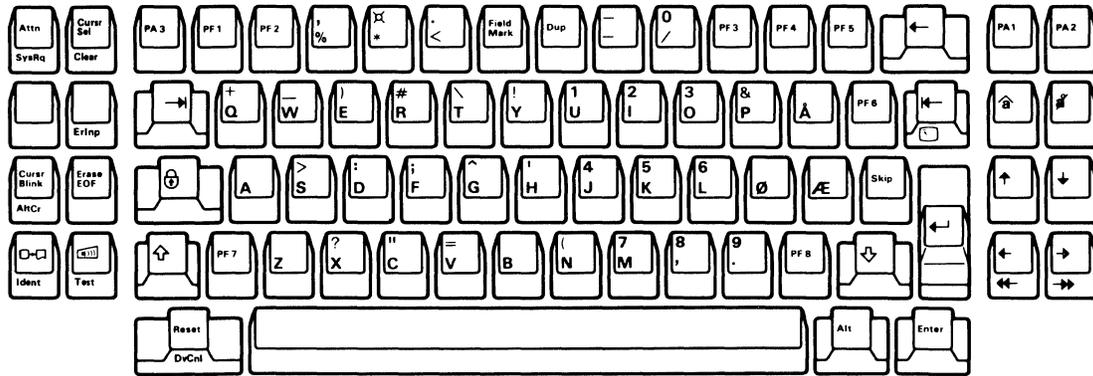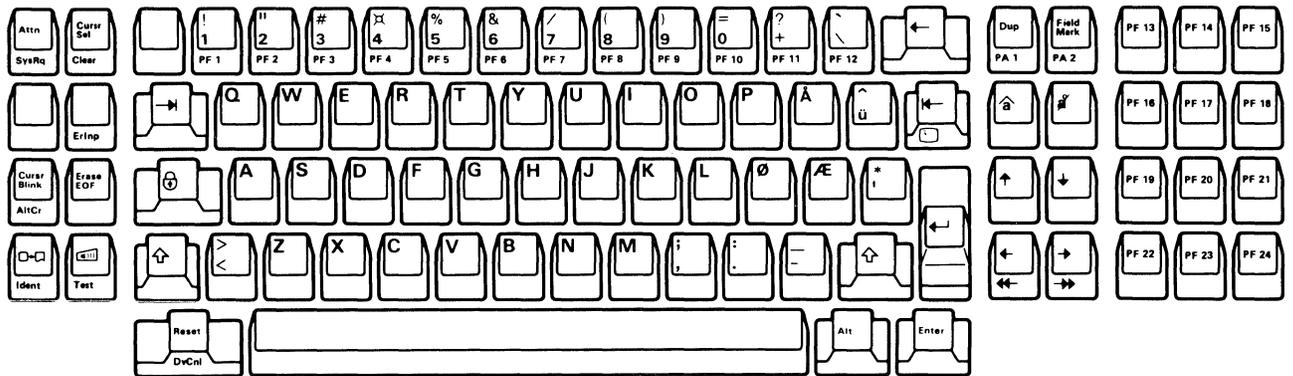
87-Key Keyboard

Figure E-10. Keyboard Layouts—Norwegian

75-Key Keyboard
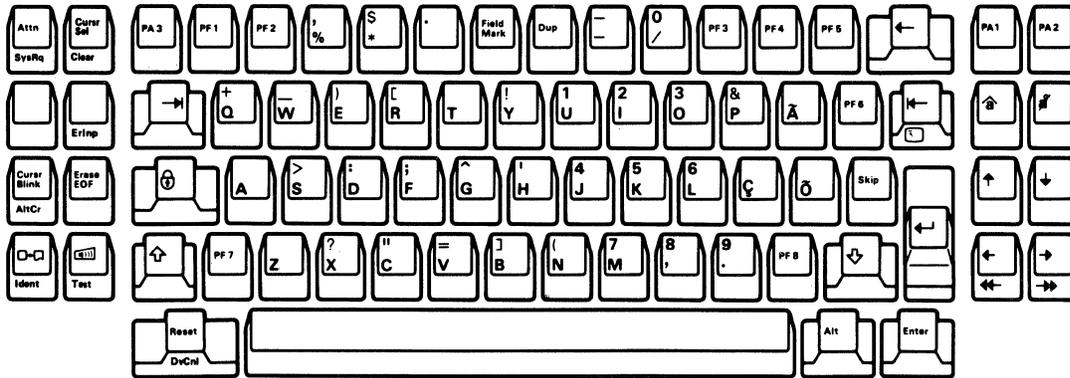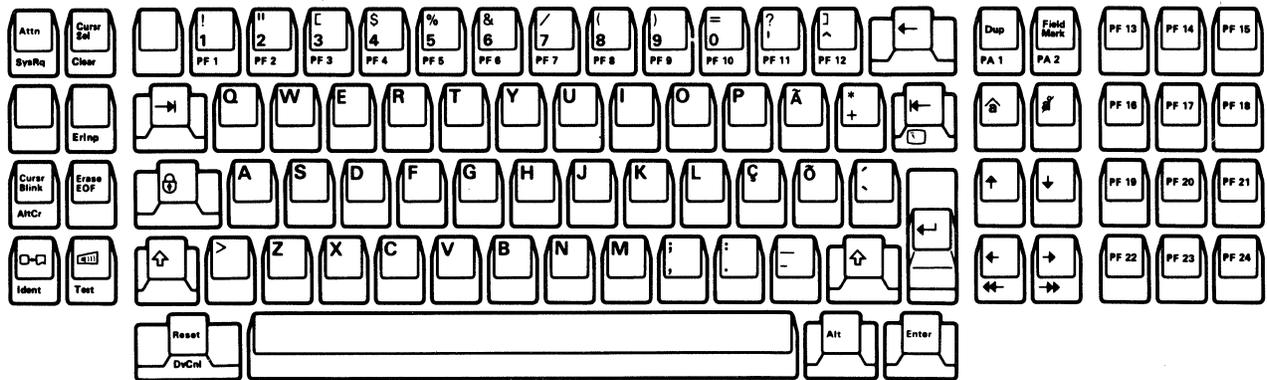
87-Key Keyboard

Figure E-11. Keyboard Layouts—Portuguese

75-Key Keyboard
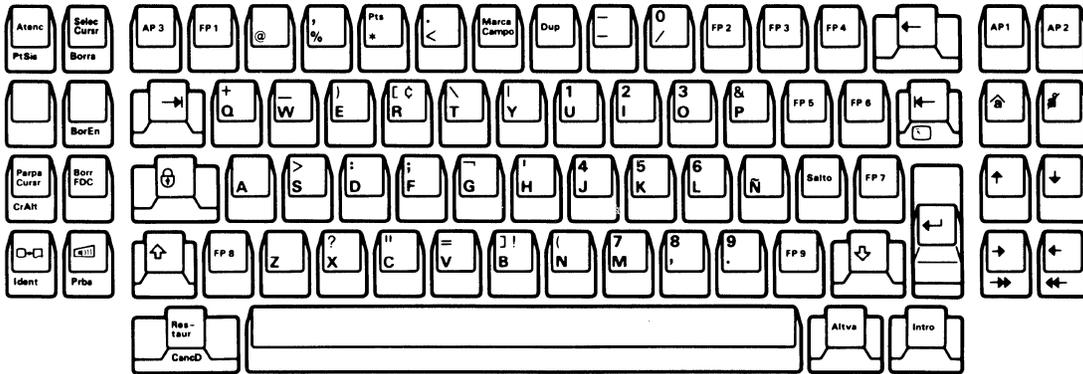
87-Key Keyboard
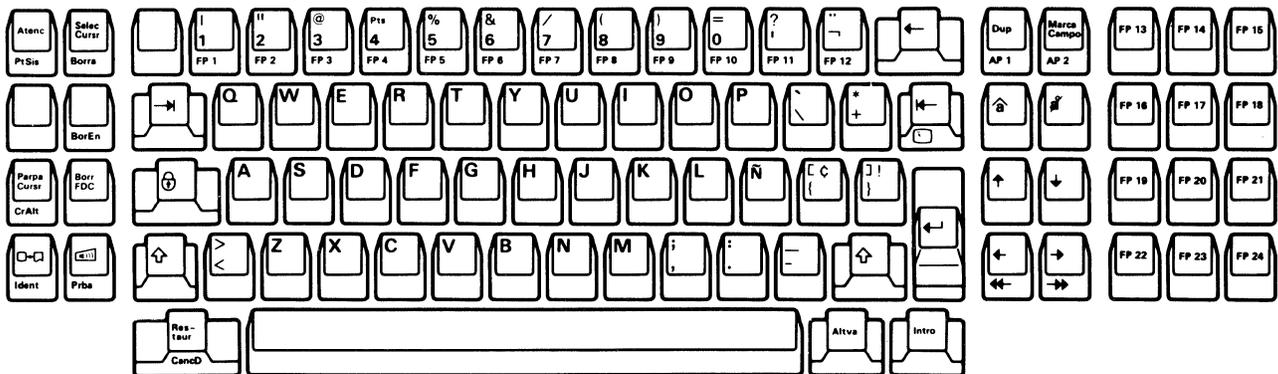
Figure E-12. Keyboard Layouts–Spanish

75-Key Keyboard
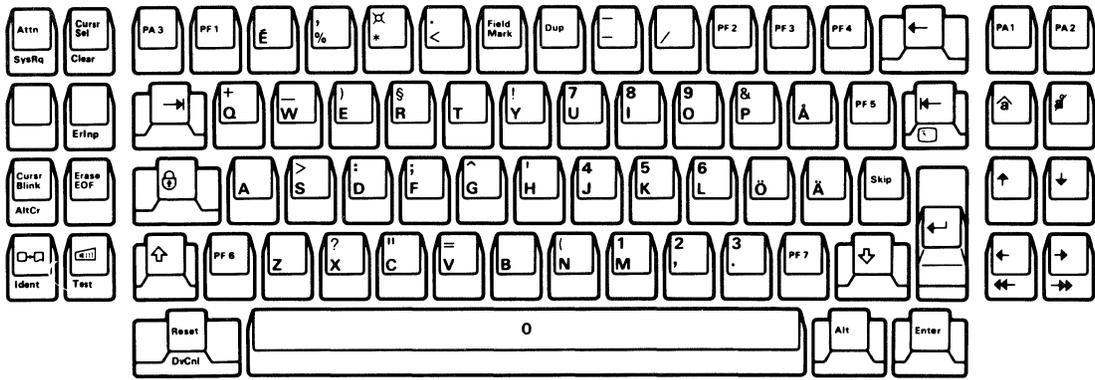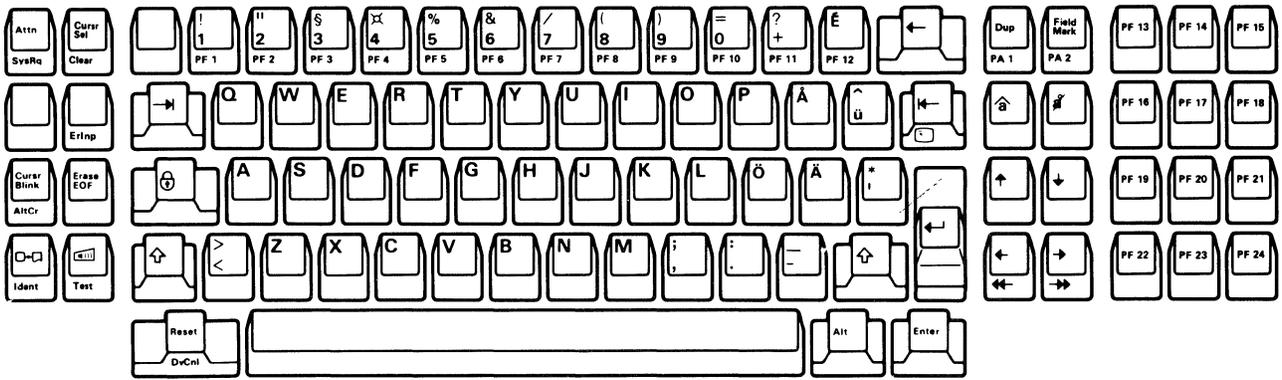
87-Key Keyboard

Figure E-13. Keyboard Layouts—Swedish

E-14
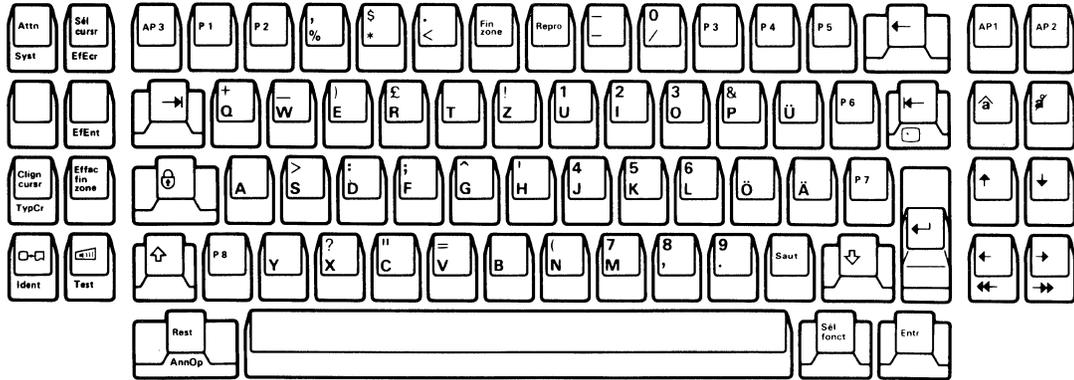
75-Key Keyboard
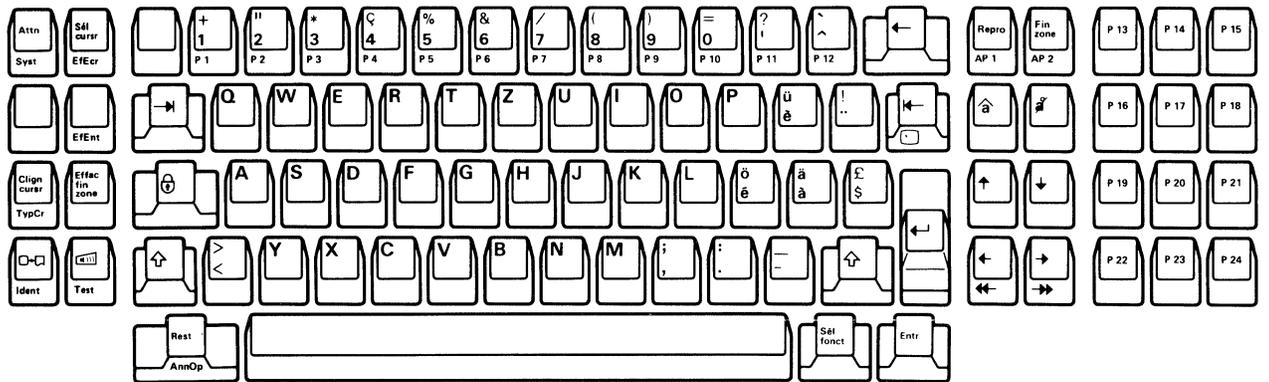
87-Key Keyboard

Figure E-14. Keyboard Layouts—Swiss-Bilingual French
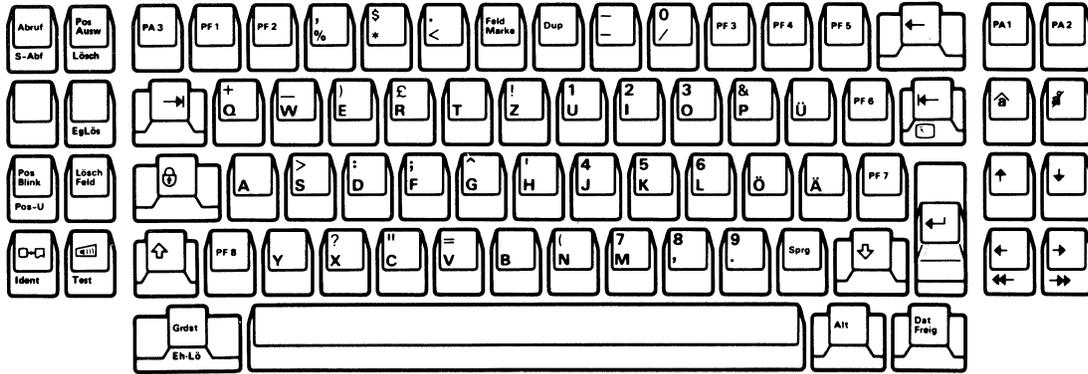
75-Key Keyboard
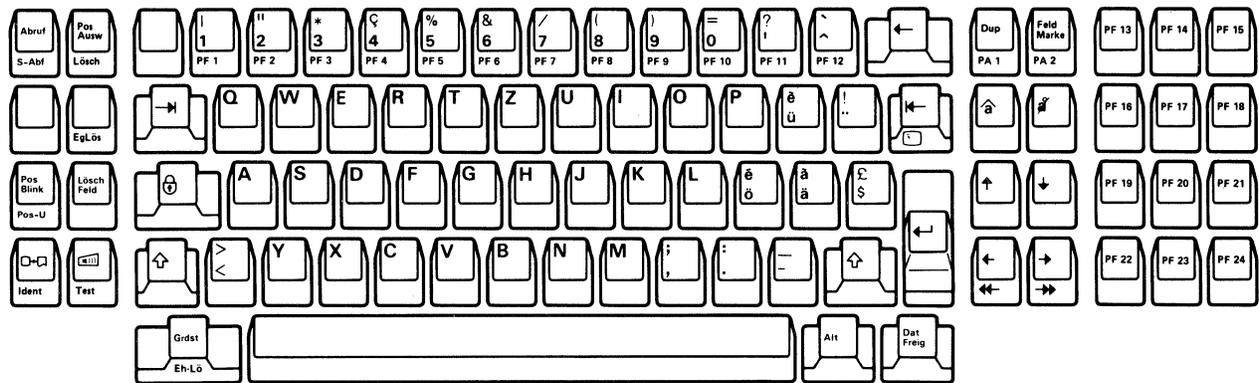
87-Key Keyboard

Figure E-15. Keyboard Layouts—Swiss-Bilingual German

E-16
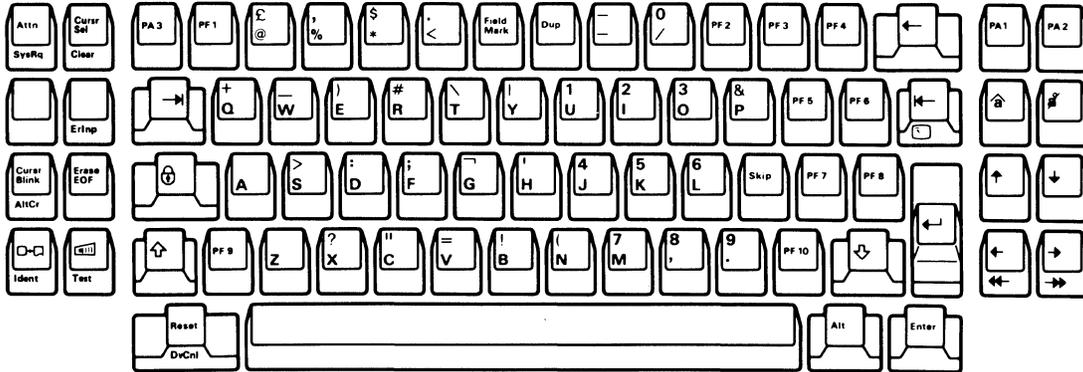
75-Key Keyboard

87-Key Keyboard
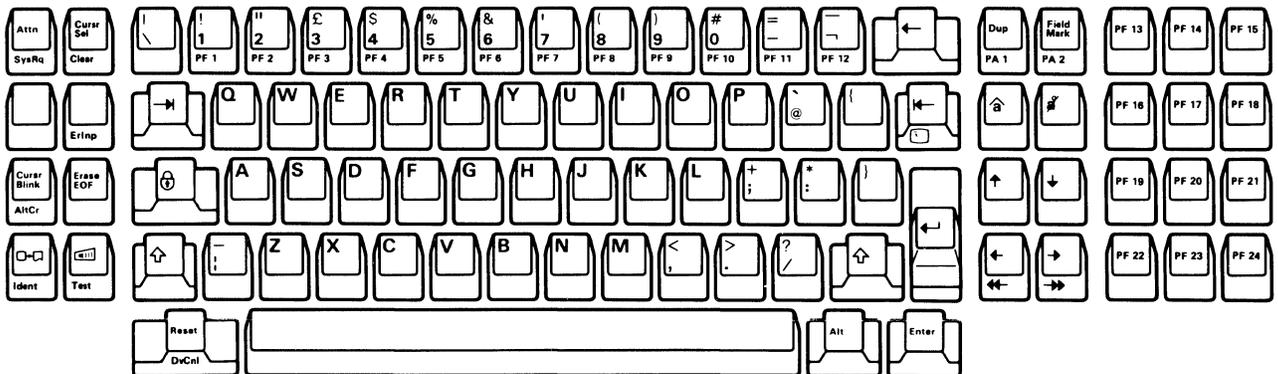
Figure E-16. Keyboard Layouts—English (United Kingdom)

E.3 Electrical Requirements

This section has information about electrical requirements of various countries.

POWER

	Countries
Requirements	Austria Belgium Denmark Finland France Germany Italy Netherlands Norway Portugal South Africa Spain Sweden Switzerland U.K.
Frequency (Hz)	50
KVA (Maximum)	0.08
Phase	Single
Maximum Working Current (Amperes)	0.5
Voltage (Vac)	220 − 240
Power Cord	3.0 m (9.8 ft)
	3-wire, with green and yellow grounding wire
Plug Type	See "Power Plug Types"

Notes:

1. Power consumption is approximately 50 watts.

2. For safety and proper machine operation, each branch circuit must be properly grounded. A separate insulated grounding conductor is recommended. If you have any concerns about grounding arrangements, consult your electrician.

CAUTION
The power-attachment cable plug (when supplied) is approved for use with this machine and meets the relevant testing laboratory, country, or test-house standards. For the user's 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 machine. The customer is responsible for receptacle wiring.

E.4 Cable Installation

Figure E-17 shows the cables for the IBM 3178 Display Station.
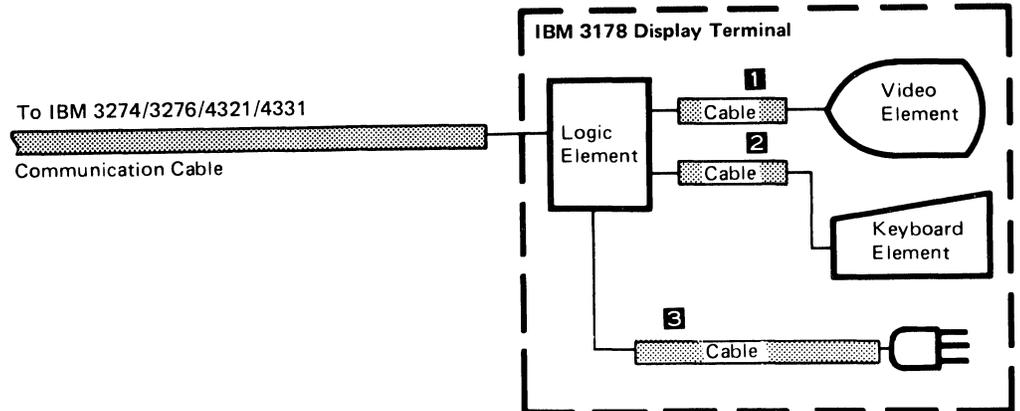
Callout	From	To	Cable Length	Description
❶	Logic Element	Video Element	0.61 m (2 ft)	Video Cable
❷	Logic Element	Keyboard Element	0.9 m (3 ft)	Keyboard Cable
❸	Logic Element	Outlet	3.0 m (9.8ft)	Power Cable

Note: The customer is responsible for obtaining a communication cable for the IBM 3178.

Figure E-17. Cables for the IBM 3178

E.5 Power Plug Types

For a World Trade country, IBM supplies the power cord with an attached plug for the power outlet receptacle most used in that country. The plug that the IBM 3270 System, IBM 4321, or IBM 4331 Processor Units have is listed in Figure E-18. The alphabetic designations in the chart refer to the diagrams in Figure E-19.

E.6 Installation of a Power Plug

Because different plugs are used in different countries, it is difficult to describe all plug installations in one procedure. However, the following items must always be considered:

1. The shield of the power cord must always have a good electrical connection to the grounding station in the plug.

2. Steps must be taken to ensure that the grounding wire and the drain (shield) wire cannot touch other (hot) wires.

3. The grounding wire (green or green-yellow) must be properly attached to the grounding station in the plug.

Country	Voltage Range 250 V	Country	Voltage Range 250 V
Arab Republic	(A)	Luxembourg	(A)
Austria	(A)	Netherlands	(A)
Bahrain	(B)	Norway	(A)
Belgium	(A)	Poland	(A)
Bulgaria	(A)	Portugal	(A)
Denmark	(E)	Qatar	(B)
Finland	(A)	Rumania	(A)
France	(A)	Saudi Arabia	(B)
Germany	(A)	South Africa	(G)
Hungary	(A)	Sierra Leone	(B)
Iceland	(A)	Spain	(A)
Ireland	(B)	Sudan	(A)
Israel	(F)	Sweden	(A)
Italy	(D)	Switzerland	(C)
Jordan	(B)	Syria	(A)
Kuwait	(B)	United Kingdom	(B)
Lebanon	(A)	Yugoslavia	(A)

Note: Other European, Middle Eastern, and African countries not listed will be shipped cords with plug (A) attached.

Figure E-18. Power Plug Usage Chart

Plug Three-Dimensional View	Plug Pin Side View	Plug Three-Dimensional View	Plug Pin Side View
A 250V 16A		**E** 250V 10A	
B 250V 13A		**F** 250V 16A	
C 250V 10A		**G** 250V 16A	
D 250V 16A			
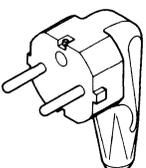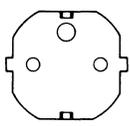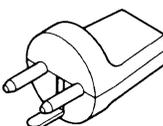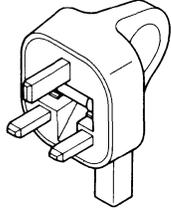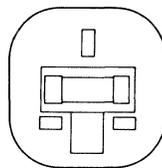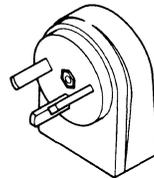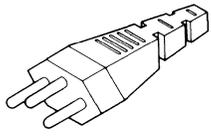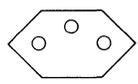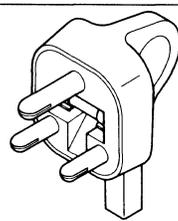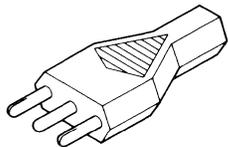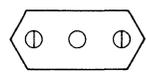
Figure E-19. Power Plug Diagrams

Appendix F. Information for the Americas and Far Eastern Countries

This appendix describes the input/output (I/O) interface codes and keyboard layouts for the various languages for the Americas and Far Eastern countries supported by the IBM 3178. Also included are the electrical requirements for each country.

F.1 I/O Interface Codes

The IBM 3178 supports EBCDIC I/O interface codes for the following languages:

- Americas and the Far East

  - Canadian-Bilingual French

  - Spanish-Speaking

  - Japanese Katakana

Figure F-1 shows the Canadian Bilingual French EBCDIC I/O interface codes for the IBM 3178 Keyboard used with the IBM 3274 Control Unit, the IBM 3276 Control Unit Display Station, IBM 4321, and the IBM 4331 Processor with a Display/Printer Adapter. Figure F-2 shows the Spanish-Speaking EBCDIC I/O interface codes, and Figure F-3 shows the Japanese Katakana EBCDIC I/O interface codes.

Bits 4567	Hex 1	00 (0)	01 (1)	10 (2)	11 (3)	00 (4)	01 (5)	01 (6)	11 (7)	00 (8)	01 (9)	10 (A)	11 (B)	00 (C)	01 (D)	10 (E)	11 (F)
0000	0	NUL				SP	&	–					`	{	}	\	0
0001	1		SBA				é	/	É	a	j	~		A	J		1
0010	2		EUA			â	ê	Â	Ê	b	k	s		B	K	S	2
0011	3		IC				ë		Ë	c	l	t		C	L	T	3
0100	4					à	è	À	È	d	m	u		D	M	U	4
0101	5	PT	NL							e	n	v		E	N	V	5
0110	6						î		î	f	o	w		F	O	W	6
0111	7						ï		ï	g	p	x		G	P	X	7
1000	8					ç		ç		h	q	y		H	Q	Y	8
1001	9		EM						`	i	r	z		I	R	Z	9
1010	A					Ç	!	¦	:								
1011	B					.	$	,	#					ô	û	Ô	Û
1100	C	FF	DUP		RA	<	*	%	@						ü		Ü
1101	D	CR	SF			(	)	_	'		˛		¨		ù		`Ù
1110	E		FM			+	;	>	=			´					
1111	F				SUB	|	¬	?	‖								

Legend:

CR	Carriage Return Code
DUP	Duplicate Character Code
EM	End-of-Message Printer Control Character
EUA	Erase Unprotected to Address Order Code
FF	Form Feed Printer Control Character
FM	Field Mark Character
IC	Insert Cursor Order Code
NL	New Line Code
NUL	Null Character Code
PT	Program Tab Order Code
RA	Repeat to Address Order Code
SBA	Set Buffer Address Order Code
SF	Start Field Order Code
SP	Space Character
SUB	Substitute Character (Error Override)

Figure F-1. Canadian Bilingual French EBCDIC I/O Interface Codes

	Hex 1 Bits 4567	Hex 1	00				01				10				11				Bits 0,1
			00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	← 2,3
			0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	← Hex 0
0000		0	NUL				SP	&	-						{	}	\	0	
0001		1		SBA				/			a	j	··		A	J		1	
0010		2		EUA							b	k	s		B	K	S	2	
0011		3		IC							c	l	t		C	L	T	3	
0100		4									d	m	u		D	M	U	4	
0101		5	PT	NL							e	n	v		E	N	V	5	
0110		6									f	o	w		F	O	W	6	
0111		7									g	p	x		G	P	X	7	
1000		8									h	q	y		H	Q	Y	8	
1001		9		EM						`	i	r	z		I	R	Z	9	
1010		A					[	]	ñ	:									
1011		B					.	$	,	Ñ									
1100		C	FF	DUP		RA	<	*	%	@									
1101		D	CR	SF			(	)	_	'									
1110		E		FM			+	;	>	=									
1111		F				SUB	|	¬	?	"									

Legend:

CR	Carriage Return Code	NL	New Line Code
DUP	Duplicate Character Code	NUL	Null Character Code
EM	End of Message Printer Control Character	PT	Program Tab Order Code
		RA	Repeat to Address Order Code
EUA	Erase Unprotected to Address Order Code	SBA	Set Buffer Address Order Code
		SF	Start Field Order Code
FF	Form Feed Printer Control Character	SP	Space Character
		SUB	Substitute Character (Error Override)
FM	Field Mark Character		
IC	Insert Cursor Order Code		

Figure F-2. Spanish-Speaking I/O Interface Codes

Bits 4567 / Hex 1	Hex 0	00				01				10				11			
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0000	0	NUL				SP	&	-			ソ					$	0
0001	1		SBA			｡	エ	/		ア	タ	ー		A	J		1
0010	2		EUA			┌	オ			イ	チ	ヘ		B	K	S	2
0011	3		IC			┘	ヤ			ウ	ツ	ホ		C	L	T	3
0100	4					ヽ	ユ			エ	テ	マ		D	M	U	4
0101	5	PT	NL			・	ヨ			オ	ト	ミ		E	N	V	5
0110	6					ヲ	ッ			カ	ナ	ム		F	O	W	6
0111	7					ア				キ	ニ	メ		G	P	X	7
1000	8					イ	─			ク	ヌ	モ		H	Q	Y	8
1001	9		EM			ウ				ケ	ネ	ヤ		I	R	Z	9
1010	A					£	!		:	コ	ノ	ユ	レ				
1011	B					.	¥	,	#				ロ				
1100	C	FF	DUP		RA	<	*	%	@	サ		ヨ	ワ				
1101	D	CR	SF			(	)	_	'	シ	ハ	ラ	ン				
1110	E		FM			+	;	>	=	ス	ヒ	リ	゛				
1111	F				SUB	|	¬	?	‖	セ	フ	ル	゜				

Legend:

CR	Carriage Return Code
DUP	Duplicate Character Code
EM	End-of-Message Printer Control Character
EUA	Erase Unprotected to Address Order Code
FF	Form Feed Printer Control Character
FM	Field Mark Character
IC	Insert Cursor Order Code
NL	New Line Code
NUL	Null Character Code
PT	Program Tab Order Code
RA	Repeat to Address Order Code
SBA	Set Buffer Address Order Code
SF	Start Field Order Code
SP	Space Character
SUB	Substitute Character (Error Override)

Figure F-3. Japanese Katakana EBCDIC I/O Interface Codes

F.2 Keyboard Layouts

Figures F-4 through F-6 show the keyboard layouts for the languages of the Americas and the Far East.

For descriptions of the special keys for Canadian Bilingual French and Japanese Katakana keyboards, see Chapter 4.

75-Key Keyboard
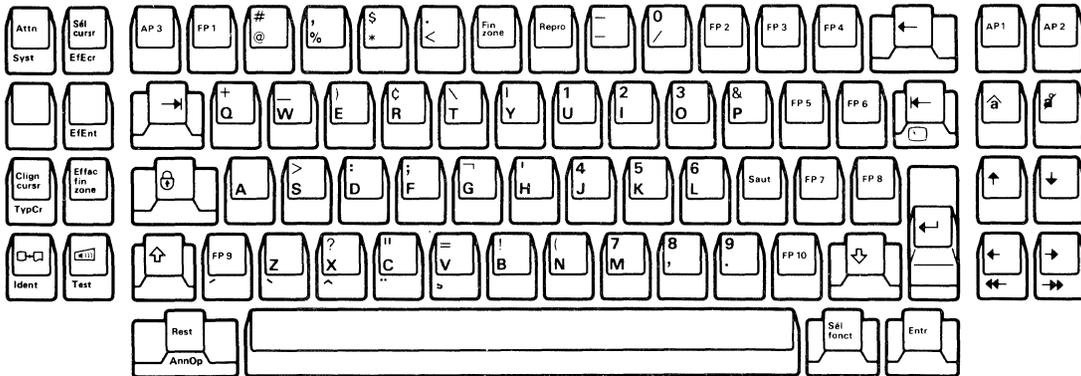
87-Key Keyboard
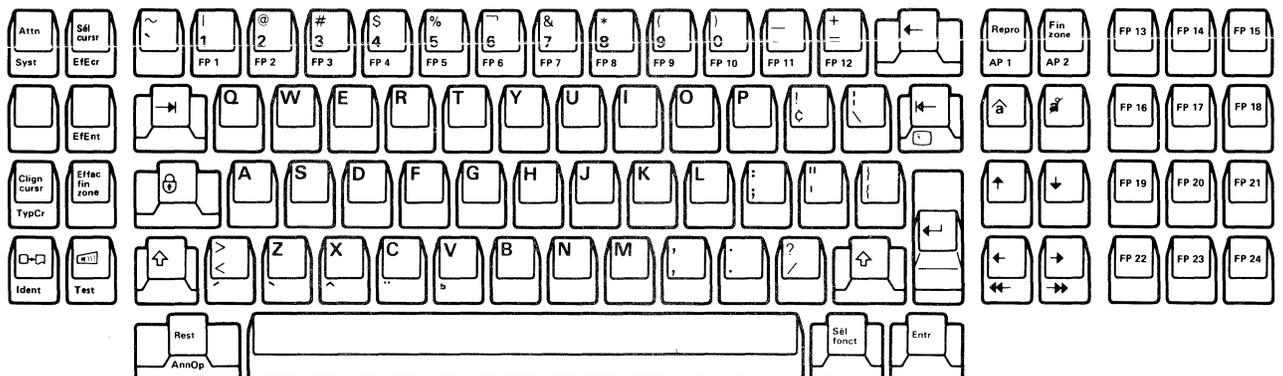
Figure F-4. Keyboard Layouts—Canadian-Bilingual French
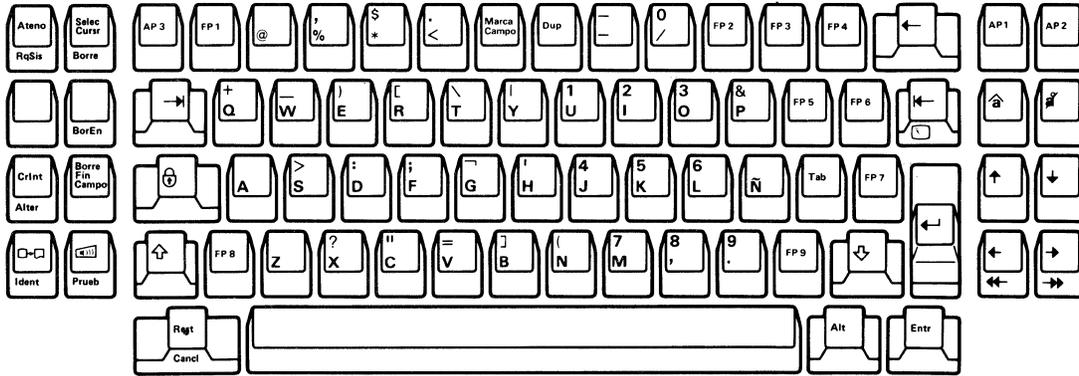
75-Key Keyboard
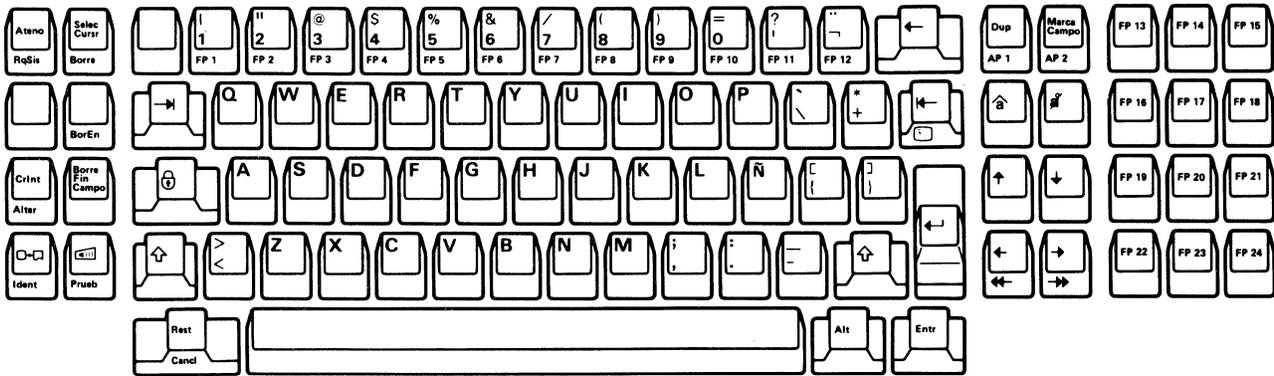
87-Key Keyboard

Figure F-5. Keyboard Layouts—Spanish-Speaking

76-Key Keyboard
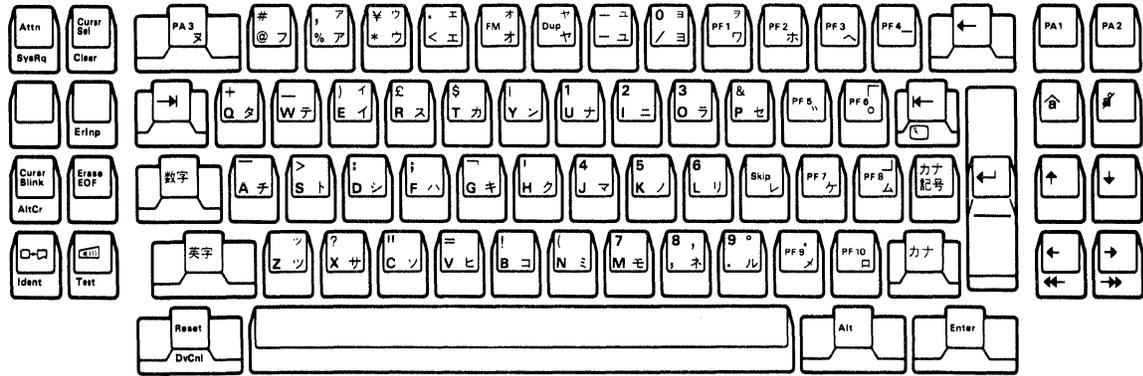
88-Key Keyboard
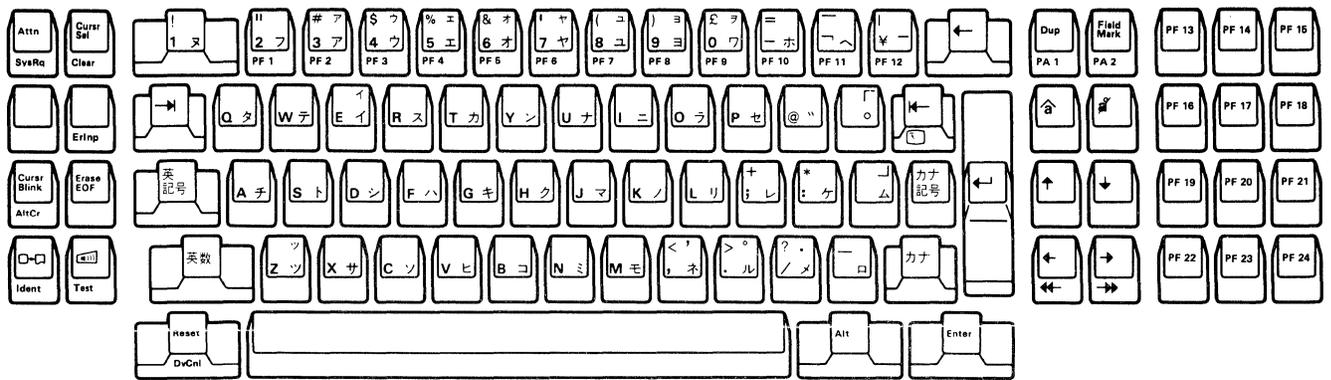
Figure F-6. Keyboard Layouts—Japanese Katakana

F.3 Electrical Requirements

This section has information about electrical requirements of various countries.

POWER

Requirements	Countries		
	Canada	Japan Mexico	Australia Malaysia New Zealand
Frequency (Hz)	60	50/60	50/60
KVA (Maximum)	0.08	0.08	0.09
Phase	Single	Single	Single
Maximum Working Current (amperes)	0.8	0.8	0.5
Voltage (Vac)	104 - 127	90 - 110	200 - 240
Power Cord	1.8 m (5.9 ft)	3.0 m (9.8 ft)	3.0 m (9.8 ft)
	3-wire, with green and yellow grounding wire		
Plug Type	See "Power Plug Types"		

Notes:

1. Power consumption is approximately 50 watts.

2. For safe and proper operation, each branch circuit must be properly grounded. A separate insulated grounding conductor is recommended. If you have any concerns about grounding arrangements, consult your electrician.

CAUTION
The power-attachment cable plug (when supplied) is approved for use with this and meets the relevant testing laboratory, country, or test-house standards. For the user's 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 machine. The customer is responsible for receptacle wiring.

F.4 Cable Installation

Figure F-7 shows the cables for the IBM 3178 Display Station.
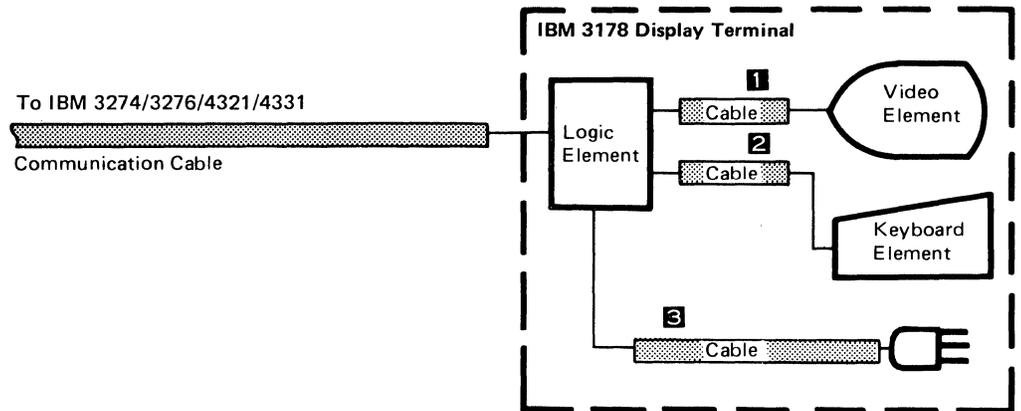
Callout	From	To	Cable Length	Description
1	Logic Element	Video Element	0.61 m (2 ft)	Video cable
2	Logic Element	Keyboard Element	0.9 m (3 ft)	Keyboard cable
3	Logic Element	Outlet	3.0 m (9.8ft)	Power cable (1.8m for Canada)

Note: The customer is responsible for obtaining a communication cable for the IBM 3178.

Figure F-7. Cables for IBM 3178

F.5 Power Plug Types

For the countries other than the U.S., Europe, Middle East, and Africa, IBM supplies the power cord with an attached plug for the power outlet receptacle most used in that country. The plug that the IBM 3270 System, IBM 4321, or IBM 4331 Processor will have is listed in Figure F-8. The alphabetic designations in the chart refer to the diagrams in Figure F-9.

F.6 Installation of a Power Plug

Because different plugs are used in different countries, it is difficult to describe all plug installations in one procedure. However, the following items must always be considered:

1. The shield of the power cord must always have a good electrical connection to the grounding station in the plug.

2. Steps must be taken to ensure that the grounding wire and the drain (shield) wire cannot touch other (hot) wires.

3. The grounding wire (green or green-yellow) must be properly attached to the grounding station in the plug.

Country	Voltage Range		Country	Voltage Range	
	125 V	250 V		125 V	250 V
Argentina		C	Hong Kong		C
Australia		B	Indonesia		E
Bahamas	A		Jamaica	A	
Barbados	A		Japan	A	
Bermuda	A		Korea	A	
Bolivia	A		Malaysia		C
Brunei		C	Mexico	A	
Canada	A		Netherlands Antilles	A	
Chile		D	New Zealand		B
Columbia	A		Nicaragua	A	
Costa Rica	A		Panama	A	
Dominican Republic	A		Philippines	A	
Ecuador	A		Singapore		C
El Salvador	A		Sri Lanka		F
Guatemala	A		Taiwan	A	
Guyana	A		Trinidad Tobago	A	
Haiti	A		U.S.A.	A	
Honduras	A		Venezuela	A	

Note: Other Asian and Latin American countries not listed will be shipped cords with plug **A** attached.

Figure F-8. Power Plug Usage Chart

Plug Three-Dimensional View	Plug Pin Side View	Plug Three-Dimensional View	Plug Pin Side View
A 125V 15A		**E** 250V 16A	
B 250V 10A		**F** 200V 5A	
C 250V 13A			
D 250V 16A			
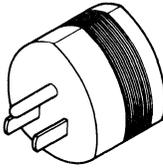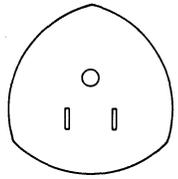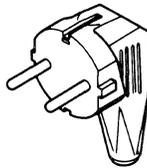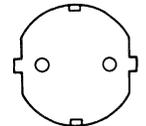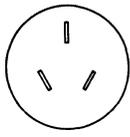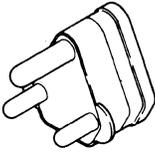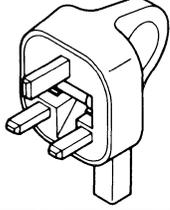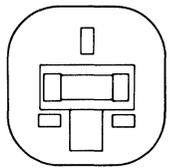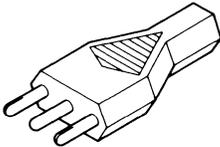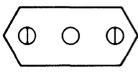
Figure F-9. Power Plug Diagrams

Glossary of Terms and Abbreviations

This glossary defines terms and abbreviations that are used in this manual. If you do not find the term you are looking for, refer to the Index or to the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems,* GC20-1699.

Definitions from American National Standards Institute (ANSI) are identified with an asterisk. An asterisk between a term and the beginning of a definition indicates that the entire definition is taken from American National Dictionary for Information Processing.

The symbol "(ISO)" at the beginning of a definition indicates that it was developed by the International Standards Organization, Technical Committee 97, Subcommittee 1. Definitions from early working papers of ISO are identified by the symbol "(SC1)."

A

A. Ampere.

ac. Alternating current.

ACTLU. Activate Logical Unit.

ACTPU. Activate Physical Unit.

AID. Attention identifier.

attention. An occurrence, external to an operation, that could cause an interruption of the operation.

attention identification (AID) character. A code that is set in the display station when the operator takes an action that produces an I/O interruption. The character identifies the action or key that caused the condition to be generated. The AID is set when the display station operator presses a program access key. It also identifies device addresses assigned to printers.

attribute. A characteristic of a display field. The attributes of a display field include protected or unprotected (against manual input and copy operations); numeric-only or alphameric input control; displayed, nondisplayed, display-intensified; and modified or not modified.

attribute character. A code that defines the attributes of the display field that follows. An attribute character is the first character in a display field, but it is not a displayable character.

audible alarm. An alarm that is activated when predetermined events occur that require operator attention or intervention for system operation.

B

BSC. Binary synchronous communication.

buffer. The hardware portion of a display station, control unit, or printer in which display or print data is stored.

C

cathode-ray tube (CRT). An electronic vacuum tube, such as a television picture tube, that can be used to display graphic images.

CD. Change direction.

character position. A location on the display surface at which one character can be displayed; also, an addressed location in the buffer at which one character can be stored.

cm. Centimeter.

control unit. A device that controls input/output operations at one or more devices.

cps. Characters per second.

CRT. Cathode-ray tube.

CU. Control unit.

cursor. (1) (SC1) A movable, visible mark used to indicate a position on a display space. (2) A movable spot of light on the display surface, usually indicating where the next character will be entered, replaced, or deleted.

cursor check. An error condition that occurs when display station circuitry detects no cursor or more than one cursor in the display buffer.

D

DACTLU. Deactivate Logical Unit.

DACTPU. Deactivate Physical Unit.

DCA. Device cluster adapter.

display field. (SC1) In computer graphics, an area in the display buffer, or on a display surface, that contains a set of characters manipulated or operated upon as a unit.

E

EB. End bracket.

EBCDIC. Extended binary-coded decimal interchange code.

end-of-file mark (EOF). A code that signals that the last record of a file has been read.

end-of-message code (EOM). The specific character or sequence of characters that indicates the end of a message or record.

EOF. End of field.

EOM. End of message.

Extended binary-coded decimal interchange code. *A coded character set consisting of 8-bit coded characters.

F

FCC. U.S. Federal Communications Commission.

field. See display field.

FM. Field mark; function management.

ft. Foot (feet).

H

Hz. Hertz.

I

I/O. Input/output.

I/O pending. The condition that results in the generation of the attention status in a locally attached display station and in a response to a polling operation in a remotely attached display station.

in. Inch (inches).

K

kVA. Kilovolt ampere (amperes).

L

logical unit. (1) In VTAM, the combination of programming and hardware that constitutes a station. (2) In SNA, one of three types of network addressable units (NAUs). It is the port through which an end user accesses function management in order to communicate with another end user. It is also the port through which the end user accesses the services provided by the system services control point (SSCP). It must be capable of supporting at least two sessions: one with the SSCP, and one with another logical unit. It may be capable of supporting many sessions with other logical units.

LU. Logical unit.

M

m. Meter (meters).

MDT. Modified data tag.

modified data tag (MDT). A bit in the attribute character of a display field, which, when set, causes that field to be transferred to the channel during a read-modified operation. The modified data tag may be set by (1) a keyboard input to the field, (2) a selector-pen detection in the field, (3) a card read-in operation, or (4) program control. The modified data tag may be reset by (1) a selector-pen detection in the field, (2) program control, or (3) the ERASE INPUT key.

N

null character. (1) (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. (2) In the IBM 3178, an all-binary 0-character that occupies a position in the storage buffer and is displayed as a blank character.

P

PA. Program access.

PF. Program function.

PLU. Primary logical unit.

Primary Logical Unit (PLU). In SNA, the logical unit(LU) that contains the primary half-session for a particular LU-LU session. Contrast with secondary logical unit.

Note: A logical unit may contain secondary and primary half-sessions for different active LU-LU sessions.

PN. Part number.

program access (PA) key. (1) A program attention key that can be defined to solicit program action that does not require data to be read from the buffer of the display station. If a Read Modified command is issued in response to the program attention key interruption, only the attention identification (AID) character is transferred to the program; no data from the buffer is transferred. (2) See also program attention key.

program attention key. (1) On a display device keyboard, a key that produces an interruption to solicit program action. (2) On the IBM 3178, these keys are the Clear key, Enter key, program function keys, and program access keys. Each program attention key is associated with a unique attention identification (AID) character.

program function (PF) key. A key on the keyboard of a display device that passes a signal to call for a particular program operation.

protected field. A display field in which the user cannot enter, modify, or erase data from the keyboard.

S

SLU. Secondary logical unit.

Secondary Logical Unit (SLU). In SNA, the logical unit (LU) that contains the secondary half-session for a particular LU-LU session. Contrast with primary logical unit.

SNA. Systems Network Architecture.

SSCP. System services control point.

Systems Network Architecture (SNA). The total description of the logical structure, formats, protocols, and operational sequences for transmitting information units through the communication system. Communication system functions are separated into three discrete areas: the application layer, the function management layer, and the transmission subsystem layer. The structure of SNA allows the ultimate origins and destinations of information—that is, the end users—to be independent of, and unaffected by, the specific communication-system services and facilities used for information exchange.

U

unprotected field. A display field in which the display station operator can enter, modify, or erase data form the keyboard.

U.S. United States.

V

V. Volt (volts).

W

WCC. Write control character.

write control character (WCC). A character used in conjunction with a write-type command to specify that a particular operation, or combination of operations, is to be performed at a display station or printer.

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Index

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