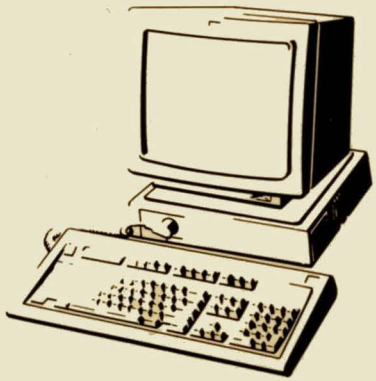
File No. S370/303X/308X/309X/4300/8100/S1-09

IBM 3162
ASCII Display Station

User's Guide



65X0035

GA18-2493-0

File No. S370/303X/308X/309X/4300/8100/S1-09

IBM 3162
ASCII Display Station

User's Guide

65X0035

GA18-2493-0

FEDERAL COMMUNICATIONS COMMISSION (FCC) STATEMENT (Applies only to those machines used in the U.S.)

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction 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.

First Edition (September 1986)

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Using This Guide

This guide introduces the IBM 3162 ASCII Display Station and covers major topics concerning installation and operation of the IBM 3162. This guide is intended for those who want to:

- Understand what the IBM 3162 is
- Install and set up the IBM 3162
- Operate the IBM 3162.

This guide has four chapters and an appendix:

- Chapter 1, "Introducing the 3162" introduces the IBM 3162 and describes its operations.
- Chapter 2, "Set-up Procedures" describes how to install and set up the IBM 3162.
- Chapter 3, "Understanding the Keyboard Functions" describes the function of each key.
- Chapter 4, "Interpreting Operator Messages" describes how to interpret the operator messages that are displayed at the bottom of the screen.
- Appendix A, "Emulating the IBM 3101 Display Terminal" contains information about the IBM 3101 emulation.

Related Publications

- *IBM 3162 ASCII Display Station Problem Solving Guide*, GA18-2494

  This guide describes how to isolate failing elements if you have a display-station problem, by using the messages displayed at the bottom of the screen and a list of symptoms. It describes how to remove and replace the video element, logic element, and keyboard. It also describes how to pack failing elements for mailing to IBM for repair or replacement.

  Note: This guide should be placed in the drawer of the logic element after completing the installation of the IBM 3162.

- *IBM 3162 ASCII Display Station Programmer's Guide and Reference Information*, GA18-2495

  This guide provides reference information on writing programs using the IBM 3162 and planning an IBM 3162 installation. You can order this guide from your place of purchase.

- *Using the IBM 3162 ASCII Display Station to Emulate the DEC[1] VT220*, GA18-2496

  This guide provides information to emulate the DEC VT220 using the IBM 3162.

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1 Trademark of Digital Equipment Corporation

- *Using the IBM 3162 ASCII Display Station to Emulate Ten ASCII Terminals*, GA18-2554

  This guide provides information to emulate one of the following ASCII terminals using the IBM 3162.

  - ADM[2]-3A
  - ADM-5
  - ADDS[3] Viewpoint-A2
  - Hazeltine[4] 1500
  - TeleVideo[5] Model 910
  - TeleVideo Model 910+
  - TeleVideo Model 912
  - TeleVideo Model 920
  - TeleVideo Model 925
  - TeleVideo Model 925E.

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2 Registered trademark of Lear Siegler, Incorporated

3 Trademark of Applied Digital Data Systems, Incorporated

4 Trademark of Hazeltine Corporation

5 Trademark of TeleVideo Systems, Incorporated

Related Publications

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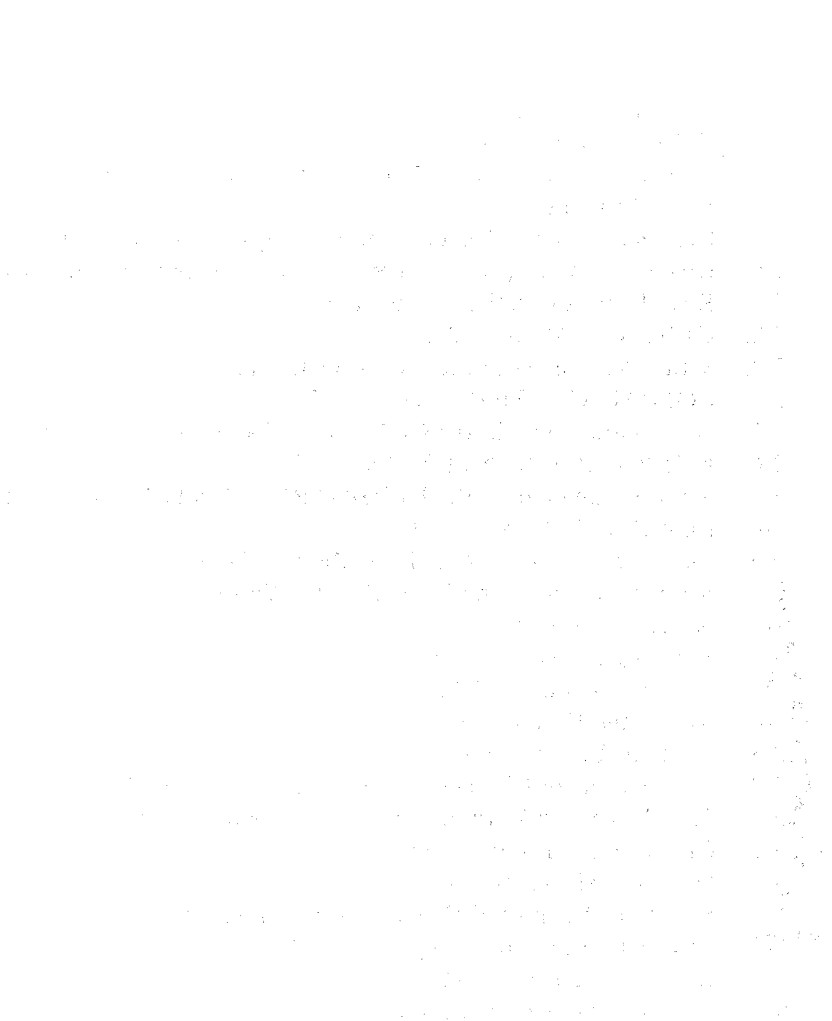


Chapter 1. Introducing the 3162

The 3162 is an ASCII Display Station used to enter data into, or retrieve data from, a host system. It can be connected to both IBM and non-IBM systems.

The 3162 has three major elements; a video element, a logic element, and a keyboard as shown in Figure 1-1. An optional cartridge can be inserted into the logic element. You can use the cartridge to emulate other manufacturer's display terminals.

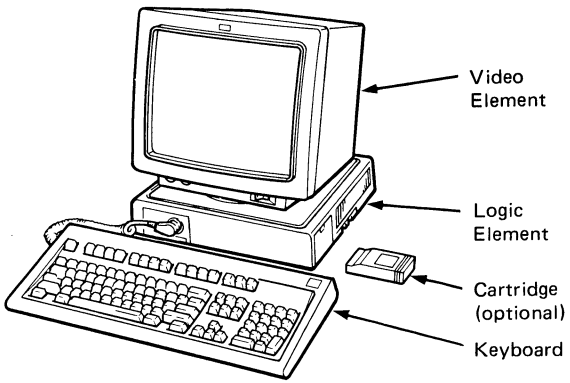


Figure 1-1. 3162 ASCII Display Station

Overview of the 3162

The display station allows you to:

- **Display (14-inch monochrome screen)**
  - Adjust brightness and contrast for viewing comfort
  - Adjust tilt and swivel for viewing angle
  - Display blink, underscore, reverse video, and high intensity characters or display no characters
  - Select normal or reverse video for the whole screen
  - Select the smooth scroll
  - Select the screen format from (1) 24 lines of 80 characters each, (2) 28 lines of 80 characters each, (3) 24 lines of 132 characters each, and (4) 28 lines of 132 characters each.
  - View as many as three viewports simultaneously
  - Extend the life of the CRT (cathode-ray tube) with use of the CRT saver option
  - Determine the host and display status in the operator information area.
- **Keyboard**
  - Adjust the keyboard angle for operating comfort
  - Enter superscript and subscript characters (applies only to the keyboard with numeric keypad)
  - Draw lines using special keys (applies only to the keyboard with numeric keypad).

- **Other Functions**
  - Adjust the sound of the audible alarm using the alarm keys
  - Define setup values using setup menus
  - Define function keys
  - Emulate other types of display terminals.

Display Station Elements

This section describes each element of the 3162.

Video Element

The video element, which also supplies power to the logic element and the keyboard, is used to display data sent from the host system or data entered from the keyboard.

Figure 1-2 shows the locations of the controls and indicators on the video element and Figure 1-3 on page 1-5 explains their functions.

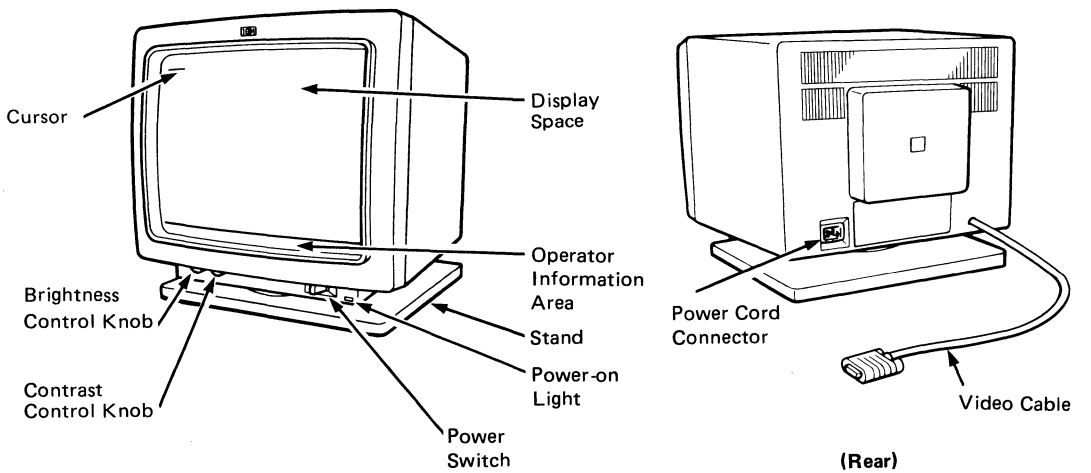


Figure 1-2. Video Element

Controls and Indicators	Description
Display Space	The area above the operator information area, which can be divided into as many as three viewports for simultaneous viewing. It can display data characters in one of the following screen formats with a 14-inch screen: • 24 lines of 80 characters each (1920 characters) • 28 lines of 80 characters each (2240 characters) • 24 lines of 132 characters each (3168 characters) • 28 lines of 132 characters each (3696 characters). You can select a screen format from the GENERAL menu. You can also select the screen appearance (normal or reverse video) from the GENERAL menu.
Cursor	Indicates where the next character is to be entered. You can select the cursor type among block, blinking block, bar, and blinking bar using the *Alt Csr* key.

Figure 1-3 (Part 1 of 2). Controls and Indicators on the Video Element

Controls and Indicators	Description
Operator Information Area (OIA)	The screen area on the bottom line of the screen contains indicators and messages to help you determine the status of the 3162. The OIA is not displayed when you power-on the 3162 the first time after installation. You can turn on the OIA indication using the *Msg* key. The OIA is displayed in reverse video until the Screen option in the GENERAL menu is changed.
Power Switch	Supplies power to the display station. *Note:* Switching the Power switch to O (Off), then quickly to I (On), may produce a problem. To reset this condition, set the Power switch to O; wait several seconds; set the Power switch to I.
Power-on Light	Indicates that the Power switch has been set to I (On) and power is supplied to the display station.
Brightness Control Knob	Adjusts the brightness of the screen.
Contrast Control Knob	Adjusts the contrast of the characters.
Stand	Adjusts tilt and swivel for the video element.
Power Cord Connector	Is used to connect the power cord.
Video Cable	Connects to the video connector of the logic element.

Figure 1-3 (Part 2 of 2). Controls and Indicators on the Video Element

Logic Element

The logic element controls the 3162 functions and communications. It provides connectors for the keyboard at the front side, and for communications and an optional device (such as a printer) cables at the rear side, as shown in Figure 1-4.

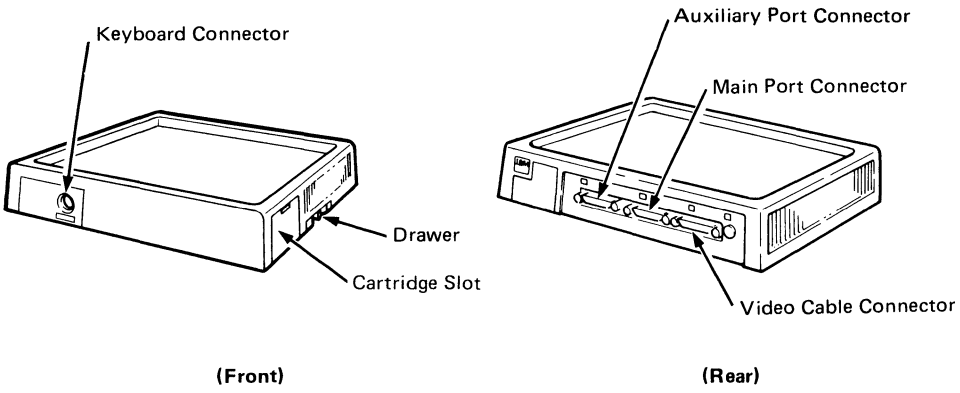


Figure 1-4. Logic Element

Figure 1-5 on page 1-8 explains the connectors and other parts on the logic element.

Connectors	Description
Keyboard Connector	Is used to connect the keyboard.
Drawer	Is used to keep the *IBM 3162 ASCII Display Station Problem Solving Guide.* The guide will help you if you have a display station problem.
Cartridge Slot	Is used to insert the cartridge if required.
Main Port Connector	Is used to connect the display station to a host system using a communication cable.
Auxiliary Port Connector	Is used to connect an optional device (such as a printer) to print screen data or data from the host system.
Video Cable Connector	Is used to connect the video cable.

Figure 1-5. Connectors and Other Parts on the Logic Element

Keyboard

The keyboard is used to enter data and perform various functions. You can also enter some host commands from the keyboard. Adjustable legs located at the rear of the keyboard allow you to change the keyboard angle for operating comfort.

A keyboard overlay (GX18-2143) is provided to make the use of the function keys easier when the keys are redefined. You can also replace the key caps with the accessory key caps (see "Accessories" on page 1-12).

The sound of the audible alarm can be changed from the keyboard using the + *Alrm* or − *Alrm* key. See Chapter 3, "Understanding the Keyboard Functions" on page 3-1 for the function of each key.

Note: In the U.S., the keyboard without numeric keypad is also available. See "Keyboard Without Numeric Keypad" on page 3-20 for more information.

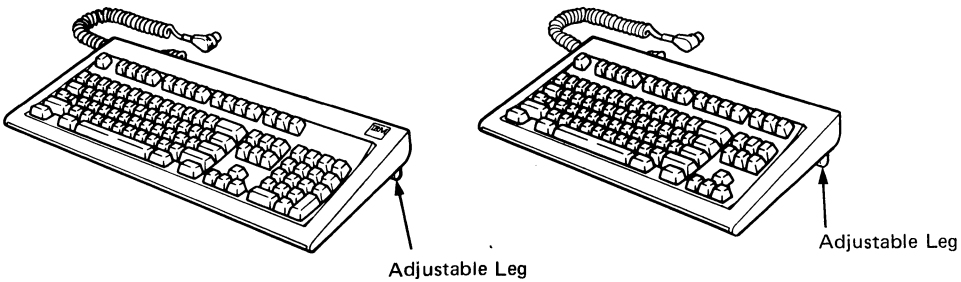


Figure 1-6. Keyboards With (Left) and Without (Right) Numeric Keypad

Setting up the Display Station

Before you can use the 3162, you must install and set it up correctly. You can install the 3162 without the assistance of an IBM service representative. The following shows the recommended steps when installing the 3162.

1. Read Appendix A, "Installation Planning" in the *IBM 3162 ASCII Display Station Programmer's Guide and Reference Information* and do the procedures that are needed.

2. Install and set up the display station using the steps in Chapter 2, Set-up Procedures, in this guide.

Solving Problems

If you have a display station problem, refer to the *IBM 3162 ASCII Display Station Problem Solving Guide*. It will help you isolate the problem. You should place the guide in the drawer of the logic element after installing the display station.

The setup-value definitions (explained in the later chapter) are stored in the logic element; therefore, **you must redefine these values when you replace the logic element**.

Emulating Other Display Terminals

The 3162 can emulate the following ASCII terminals:

- IBM 3101 Models 23 and 881
- DEC VT220
- ADM-3A
- ADM-5
- ADDS Viewpoint-A2
- Hazeltine 1500
- TeleVideo Model 910
- TeleVideo Model 910+
- TeleVideo Model 912
- TeleVideo Model 920
- TeleVideo Model 925
- TeleVideo Model 925E.

The IBM 3101 emulation is built into the logic element. You can select it from a setup menu. See Appendix A, "Emulating the IBM 3101 Display Terminal" on page A-1 for more information.

A unique feature of the 3162 is a plug-in cartridge. By inserting an emulation cartridge into the logic element, you can use the display station as one of the ASCII terminals listed above (except IBM 3101). See the emulation guide shipped with the cartridge for more information.

Note: The ASCII terminals other than the IBM 3101 and the DEC VT220 cannot be emulated in some countries.

Relocating the Display Station

For your safety, separate the video element, the logic element, and the keyboard when moving the display station to another location. The assembled display station is too heavy to carry.

Accessories

The following accessories can be ordered:

- Blank light key caps (60 units) with removal tool (part 1351710)
- Blank dark key caps (60 units) with removal tool (part 1351728)
- Clear lens caps with paper inserts and removal tool (part 6341707)
- Paper inserts for clear lens (part 6341704)
- Key cap removal tools (6 units) (part 1351717)
- Multi-function attachment cable (part 8310553)
- 1.8 m (5.9 ft) length power cord (part 6952298)
- Modem cable (part 6343332)
- I/O cable (part 6343373).

Models

The following display station models are available in the U.S. Ask your IBM marketing representative for the models that are available in your country.

Model	Video Element	Logic Element	Keyboard
11	14-inch green screen	EIA RS-232C only for the main port interface	With numeric keypad
12	14-inch green screen	EIA RS-232C or RS-422A for the main port interface	With numeric keypad
31	14-inch green screen	EIA RS-232C only for the main port interface	Without numeric keypad
32	14-inch green screen	EIA RS-232C or RS-422A for the main port interface	Without numeric keypad

Chapter 2. Set-up Procedures

This chapter provides step-by-step procedures to set up the 3162 when operating it as an IBM 3162 or an IBM 3101. Before beginning the setup, the person responsible for the installation should have completed the preparations for installing the 3162. These preparations include:

- Site preparation
- Installation of communication cables, power receptacle, and wiring
- Determination of the setup values.

The above information is described in Appendix A, "Installation Planning" in the *IBM 3162 ASCII Display Station Programmer's Guide and Reference Information.*

If You Use an Emulation Cartridge

If you use an emulation cartridge, go to the emulation guide shipped with the cartridge for the installation and set-up procedures.

Set-up Procedures

This chapter describes the following:

- Setting up the 3162, which shows the steps needed to install the 3162.
- Defining setup values, which shows the steps needed to define the setup values.
- Defining function keys, which shows the steps needed to define the function keys.
- Setup menus and value descriptions, which explains the setup menus and setup values.

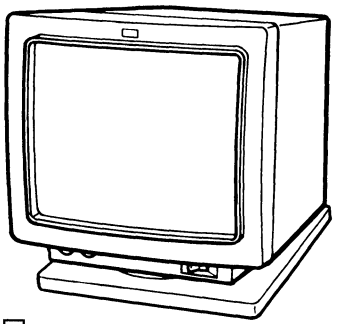
Notes:

1. *If you have any problems in the following steps, see the IBM 3162 ASCII Display Station Problem Solving Guide.*
2. *After unpacking each element, save all packing material for possible later use.*

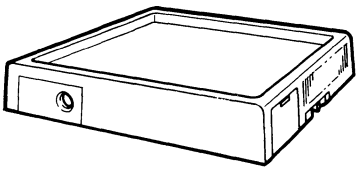
Setting up the 3162

Check each box (☐) as you unpack and identify each item. If any required items are missing, call your IBM marketing representative or place of purchase.

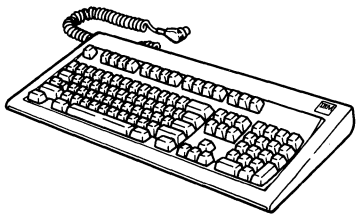
☐ Video Element



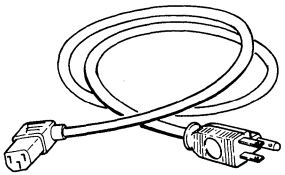
☐ Logic Element



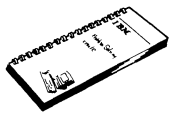
☐ Keyboard



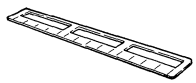
☐ Power Cord



☐ Problem Solving Guide



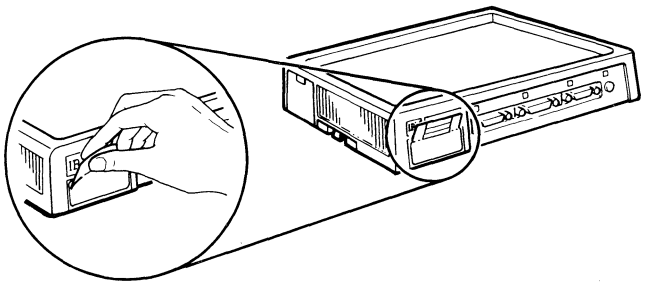
☐ Keyboard Overlay



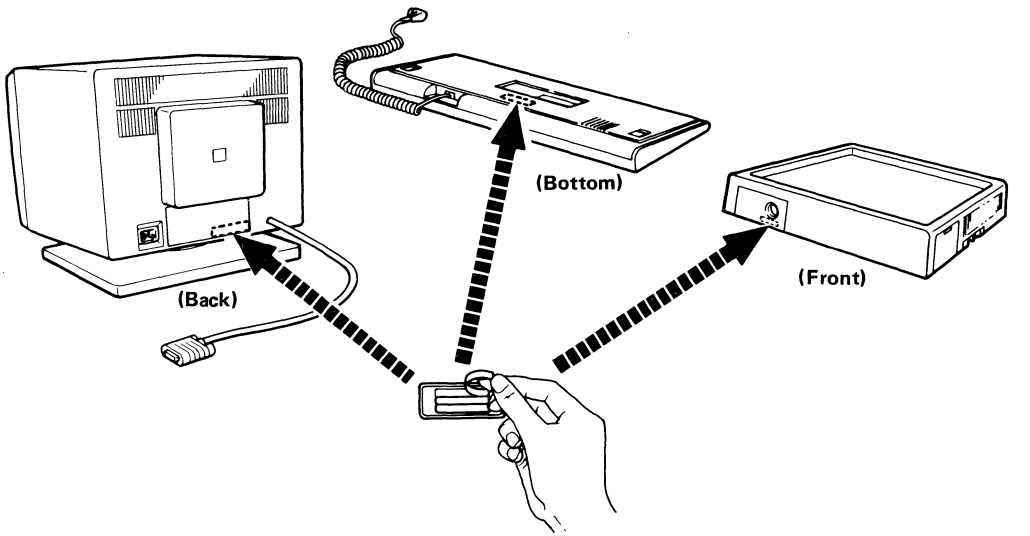
Step 2. Attaching the Labels

Important: It is important that you attach the labels to avoid possible delay if it ever becomes necessary to return the unit to IBM.

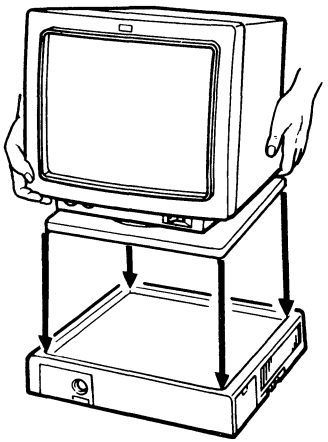
a Tear off the labels from the back of the logic element.



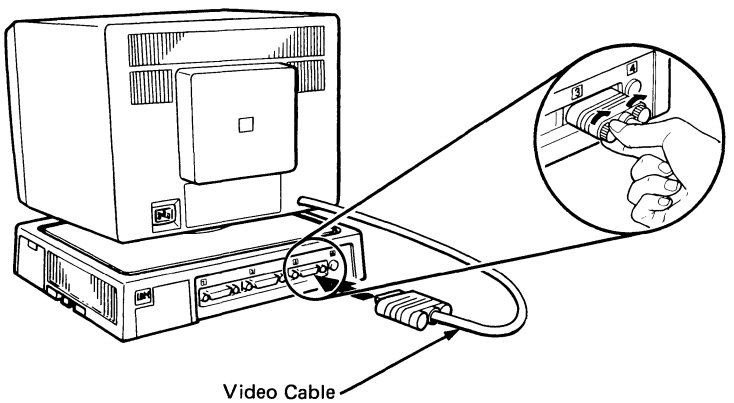
b Attach the labels to the back of the video element, the bottom of the keyboard, and the front of the logic element.



a Place the video element on the logic element.



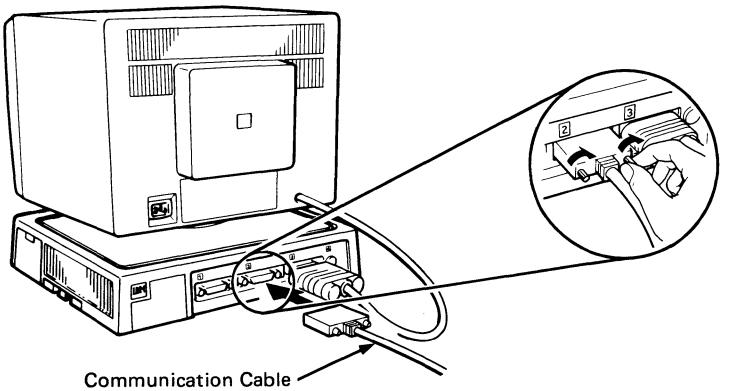
b Insert the video cable fully into the logic element (position 3), and tighten the screws.



c

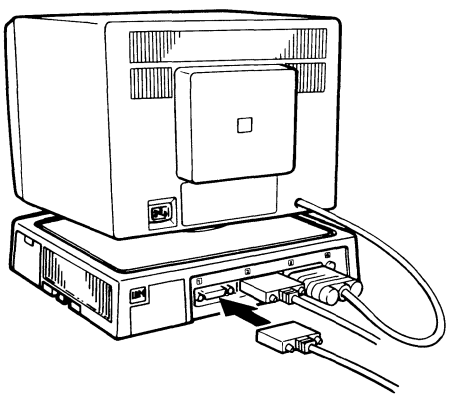
DANGER
Do not perform this step during an electrical storm. Communication cables can conduct lethal charges of electricity.

Insert the communication cable fully into the logic element (position 2), and tighten the screws.

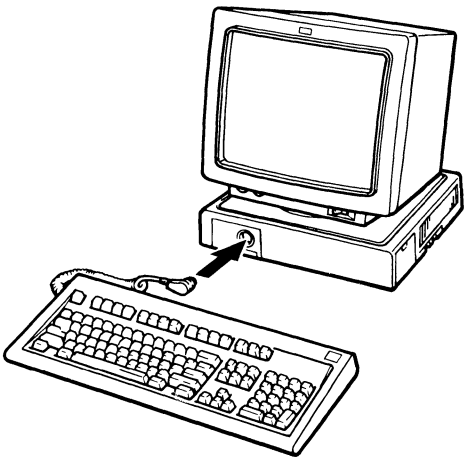


d

To connect a printer or any other optional device, insert its cable into the logic element (position 1), and tighten the screws.

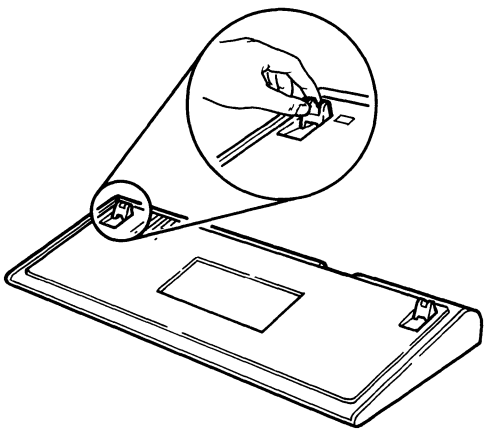


e Insert the keyboard cable into the logic element.

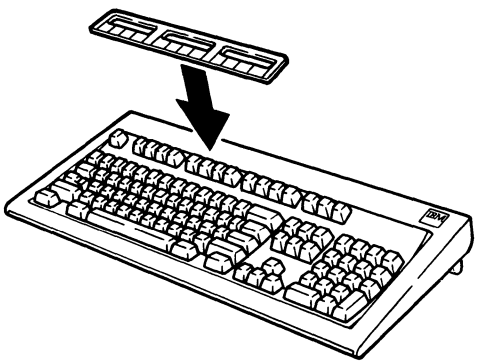


Step 4. Setting the Keyboard Angle and Placing the Overlay

a Adjust the legs as needed.



b Place the overlay on the keyboard.



Step 5. Powering-on the Display Station

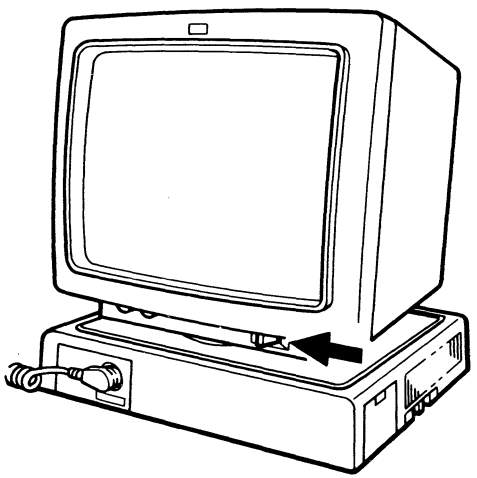
CAUTION

The power cord plug (when supplied) is approved for use with this display station and meets the relevant testing laboratory, country, or test-house standards. For your safety, the plug must be connected to a properly wired and grounded receptacle. An improperly wired receptacle could place a hazardous voltage on accessible metal parts of the display station. The customer is responsible for receptacle wiring.

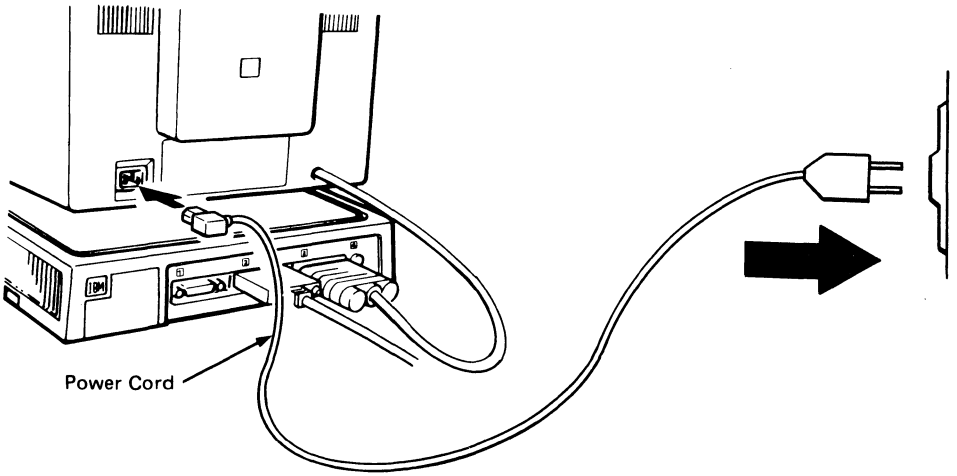
Notice for Customers in Chicago, Illinois: Two, different-length power cords are shipped with the 3162; 1.8 m (5.9 ft) and 2.8 m (9.2 ft). Do not use the 2.8 m (9.2 ft) power cord; use the 1.8 m (5.9 ft) power cord.

---

a Make sure the Power switch is set to O (Off).



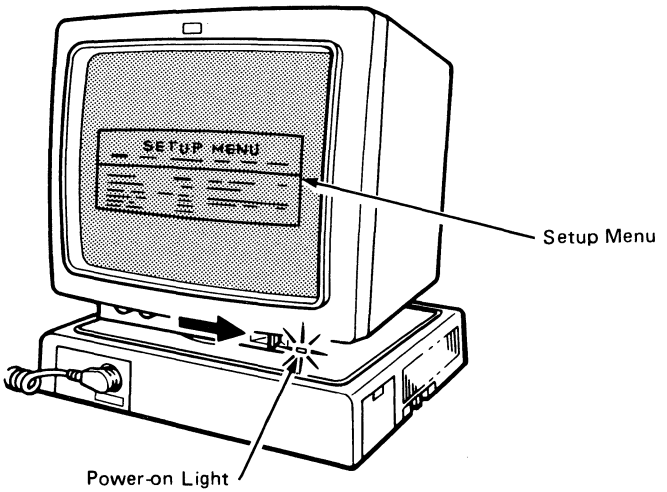
b Insert the power cord into the video element; insert the other end into a power outlet.



Step 5. Powering-on the Display Station

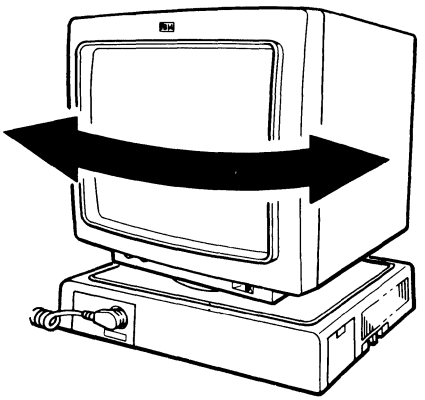
c Set the Power switch to I (On).

The power-on light should come on; the setup menu should appear; and the audible alarm should sound.

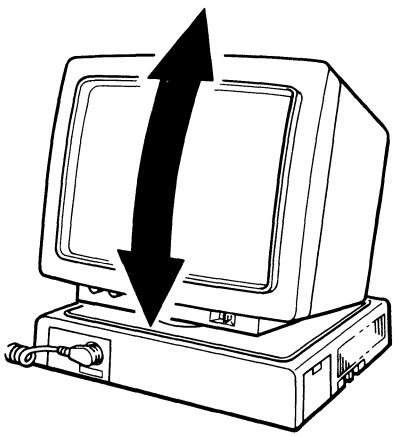


Step 6. Positioning the Video Element for Viewing Comfort

a Swivel the video element as needed.

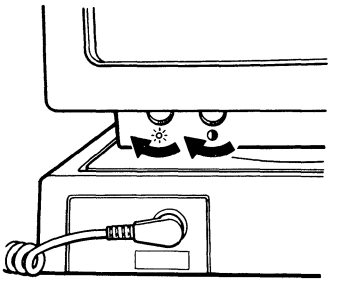


b Tilt the video element as needed.



Step 7. Adjusting the Screen Brightness and Contrast

a Turn the brightness (☼) and contrast (◑) control knobs fully clockwise.

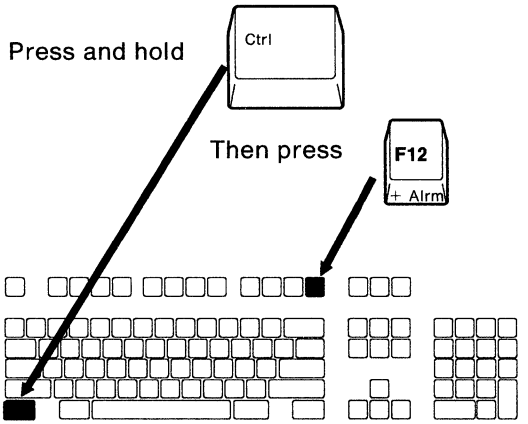


b Slowly turn the knobs (☼ for brightness and ◑ for contrast) counterclockwise until the high-intensity box becomes brighter than the other characters.

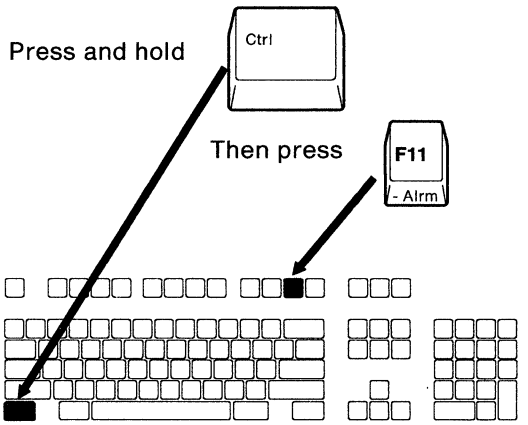
```
                    S E T U P      M E N U

GENERAL          COMMUNICATION      KEYBOARD/PRINTER        FUNCTION

Machine Mode          IBM3162       CRT Saver                    OFF
Screen                NORMAL        Line Wrap                    ON
Row and Column        24 x 80       Tab                          FIELD
Scroll                   JUMP       Term.ID
Auto LF                    ON
Forcing Insert             OFF
```

High-intensity Box

a To increase the sound of the audible alarm:



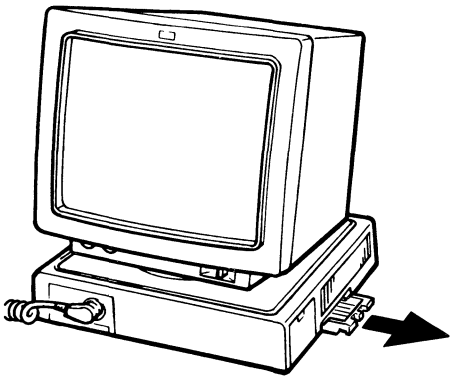
b To decrease the sound of the audible alarm:



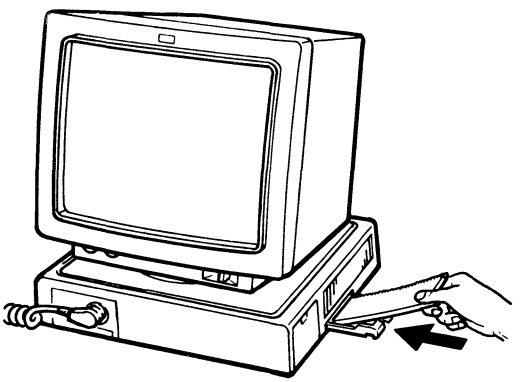
Repeat these steps until the alarm is set at a comfortable level.

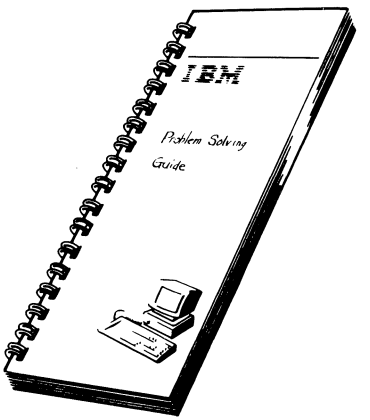
Step 9. Placing the Problem Solving Guide in the Drawer

a Pull out the drawer.



b Place the *problem solving guide* in the drawer.





Defining Setup Values

You must define the setup values so that the display station can correctly communicate with the host system or printer. The person responsible for setting up the display station should have selected the values for your installation and should have completed Figure 2-10 on page 2-37. Refer to it and do the following steps.

If Figure 2-10 on page 2-37 is not completed and you must define setup values, see "Setup Menus and Setup Value Descriptions" on page 2-22 for more information.

a Set the Power switch to I (On), if set to O (Off).

The GENERAL *menu will appear as shown below.*

Note: If you have already defined the setup values, the GENERAL menu will not appear. In this case, press and hold the *Ctrl* key; then press the *Setup* key.

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

GENERAL          COMMUNICATION        KEYBOARD/PRINTER          FUNCTION

Machine Mode              IBM3162   CRT Saver                       OFF
Screen                     NORMAL   Line Wrap                       ON
Row and Column             24 x 80  Tab                             FIELD
Scroll                     JUMP     Term.ID      ____________________
Auto LF                    ON
Forcing Insert             OFF
```

b

Refer to Figure 2-10 on page 2-37; select the field and change the value, if needed.

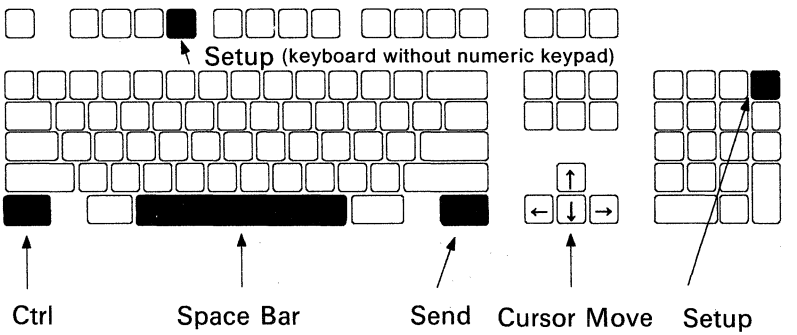
1 Using the *Cursor Move* keys (↑ ↓ ← →), select any field (high-intensity box) whose value you want to change.

2 Press the *Space Bar* until the desired value appears.

3 Repeat steps **1** and **2** until you have changed all necessary values.

Note: For the terminal ID value, key in the characters instead of pressing the *Space Bar*.

4 Select the next menu by pressing the *Send* key, and change all necessary values. Follow the same procedures for all menus (GENERAL, COMMUNICATION, KEYBOARD/PRINTER), except the FUNCTION menu, which has different purposes.



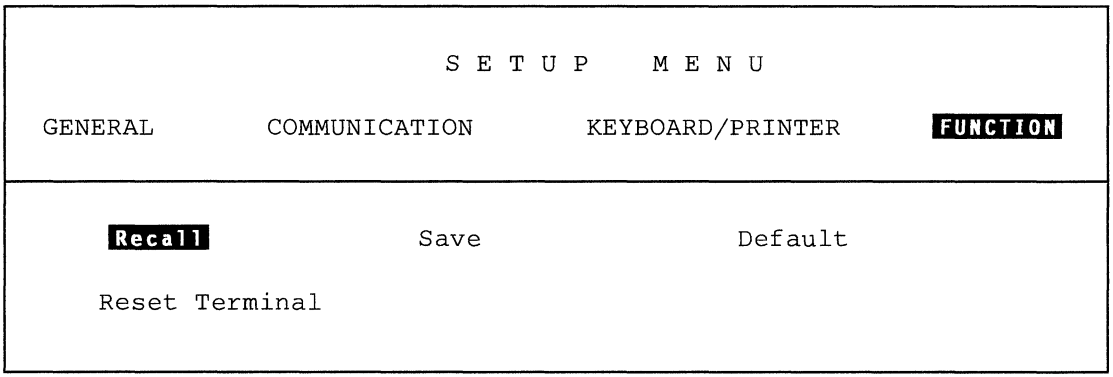
If You Need Help

If you do not understand the above procedures, see "How to Define Setup Values" on page 2-38 for a more detailed explanation.

C Select the FUNCTION menu to save the definitions that you have made on the GENERAL, COMMUNICATION, and KEYBOARD/PRINTER menus.

1 Select the FUNCTION menu by pressing the *Send* key from the KEYBOARD/PRINTER menu.

The FUNCTION *menu should look like this.*



2 Select the Save field using the *Cursor Move* keys (↑ ↓ ← →).

3 Press the *Space Bar*.

A blinking Completed *should appear telling you that the setup-value definitions are saved.*

4 Press and hold the *Ctrl* key; then press the *Setup* key to exit this mode.

Set-up procedures are now complete.

Defining Function Keys

You can redefine function keys *F1* through *F24* from the keyboard or by the host command. *F13* through *F24* are selected when the respective key is pressed with the *Shift* key. ESC (escape) sequences, ASCII control characters, or character strings can be assigned to each function key. ASCII control characters can be entered by pressing a selected alphanumeric key while holding down the *Ctrl* key. See "ASCII Control Characters" on page 3-19 for more information. If you do not redefine a function key, the associated AID (attention ID) code is generated when the function key is pressed.

Figure 2-1 shows the locations of the keys used for this step.

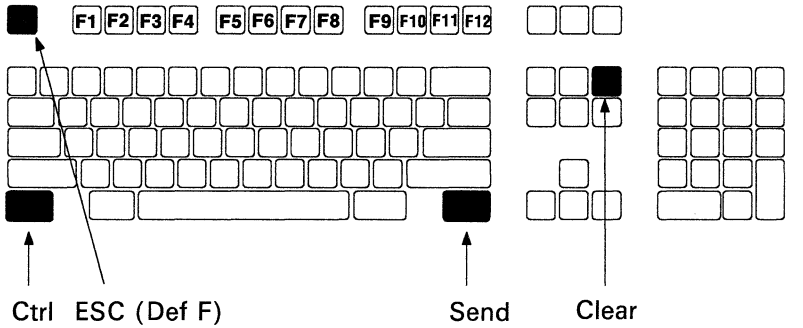


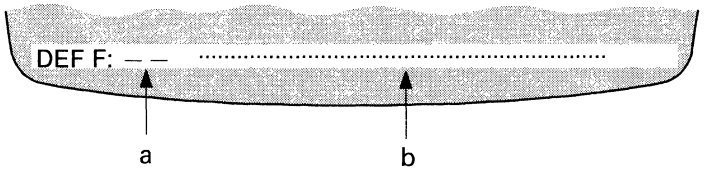
Figure 2-1. Keys Used for Defining Function Keys

The next page shows how you can define function keys using the *Def F* key.

a

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

The function key menu should appear as shown below.



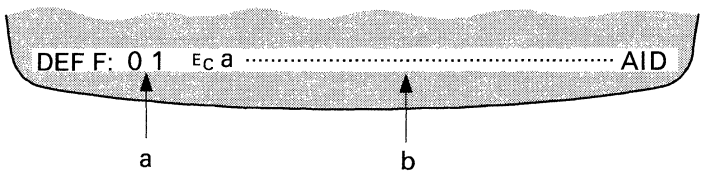
a: A two-digit number (01 through 24) of a function key is entered here.
b: The function is entered here (up to 64 characters).

b

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

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

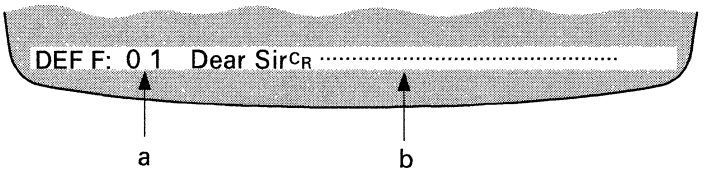
The menu will change as follows: (It shows the IBM-supplied default setting, AID format.)



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

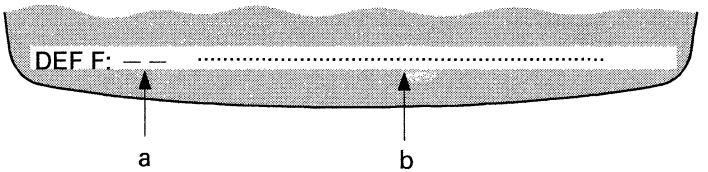
In this case, type **Dear Sir,** and enter the CR character (generated by pressing the *M* key while holding down the *Ctrl* key).

The bottom of the screen should look like this.



d Press the *Send* key to store the redefined key.

The bottom of the screen should now be:



Repeat steps **b** through **d** until you define all necessary function keys.

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

Notes:

1. *The display station can store up to 128 characters for all function-key definitions. This is accomplished by pressing the* ***Send*** *key at step* ***d****. If the total exceeds 128, overflow characters are discarded, and area* ***a*** *will blink at step* ***d****. If you do not want to save the definition, press the* ***Def F*** *key while holding down the* ***Ctrl*** *key.*

2. *The display station can store 384 additional characters in a second buffer. This is accomplished by pressing the* ***Send*** *key while holding down the* ***Ctrl*** *key at step* ***d****. However, these definitions will be lost when power is turned off.*

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

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

Setup Menus and Setup Value Descriptions

Before you can use the display station, certain information (such as the type of communication interface, line speed, and parity) must be set correctly. Such information, called *setup values*, is necessary before you can communicate with a host system or an optional device (such as a printer) on the auxiliary port. You may also want to define the type of scrolling or screen appearance (normal or reverse video) to be used. You can define setup values from the setup menus. Setup values (except screen appearance, terminal ID, and pacing for the IBM 3101 emulation mode) can also be defined by host commands.

This section describes setup menus; what the setup menus are; what the setup values mean; and how you can change the setup values.

Warning: The setup values are stored in the logic element, which means that when you first install the display station or if you ever replace the logic element, you must define these values. Otherwise, the display station may not work correctly.

Setup Menus

The 3162 provides four setup menus that you use to define setup values:

- GENERAL
- COMMUNICATION
- KEYBOARD/PRINTER
- FUNCTION.

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

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

Note: During setup mode,

- the instructions for the menu are displayed at the bottom of the screen.
- on-line operations are suspended (the incoming data is stored in the display station).

GENERAL Menu

Figure 2-2 shows the GENERAL menu. Figure 2-3 on page 2-25 explains the setup parameters, their possible values, and their meanings.

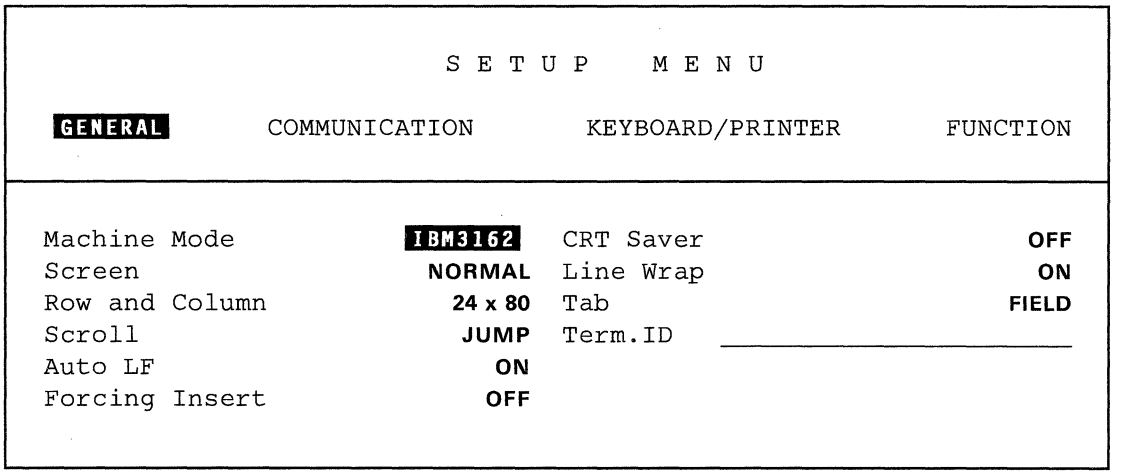


Figure 2-2. GENERAL Menu

Note: If you change the machine mode in this menu, the machine mode is immediately saved. Setup-value definitions in use are replaced with the ones for the new machine mode.

Setup Parameters	Possible Values	Meanings
Machine Mode	IBM 3162 IBM 3101	The display station operates in the selected machine mode.
Screen	NORMAL	The whole screen is displayed in normal video.
	REVERSE	The whole screen is displayed in reverse video.
Row and Column	24 x 80 28 x 80 24 x 132 28 x 132	The display station uses a screen size based on the selected rows and columns. The contents of the screen are cleared when the value is changed.
Scroll	JUMP	For example, when the last character of the last line is entered or received, all lines move up rapidly.
	SMOOTH F	For example, when the last character of the last line is entered or received, all lines move up slowly (faster than SMOOTH S).
	SMOOTH S	For example, when the last character of the last line is entered or received, all lines move up slowly (slower than SMOOTH F).
	NO	For example, when the last character of the last line is entered or received, no lines move up.

Figure 2-3 (Part 1 of 3). Setup Parameters in the GENERAL Menu

Setup Parameters	Possible Values	Meanings
Auto LF	ON	When the New Line option is CR and the *Return* key is pressed, or the CR (carriage return) character is received, the cursor moves to the first position of the next line. When the New Line option is CR/LF and the *Return* key is pressed, the cursor moves to the first position of the line after the next line.
	OFF	When the New Line option is CR and the *Return* key is pressed, or the CR character is received, the cursor moves to the first position of the current line. When the New Line option is CR/LF and the *Return* key is pressed, the cursor moves to the first position of the next line.
Forcing Insert	OFF	If there is no space to insert a character or insert a null line, an insert operation cannot be done.
	LINE	If there is no space to insert a null line and an insert line operation is requested (for example, by the *Ins Ln* key), the current line is replaced with a null line and the remaining lower lines and the previous current line move down one line. The bottom line is then discarded.
	CHARACTER	If there is no space to insert a character and an insert character operation is requested (for example, by the *Insert* key), a character can be inserted at the cursor position. However, the last character of the current line is discarded when the Line Wrap option is OFF, or the last character in the page (or the field in a formatted page) is discarded when the Line Wrap option is ON.
	BOTH	Enables the LINE and CHARACTER functions.

Figure 2-3 (Part 2 of 3). Setup Parameters in the GENERAL Menu

Setup Parameters	Possible Values	Meanings
CRT Saver	ON | OFF	When ON is selected, the screen goes blank if no data is received from the host system or entered from the keyboard for 15 minutes. When data is received or entered and this function is active, the screen displays the data again.
Line Wrap	ON	When the last character of the current line is entered or received, the cursor moves to the first position of the next line. *Note:* In block mode or in a formatted page, ON is assumed regardless of the Line Wrap setting.
	OFF	When the last character of the current line is entered or received, the cursor stays at the last position. The additional character is written over the last character.
Tab	FIELD	In a formatted page, the tab stops provided by the field attribute characters are used regardless of the column-tab definitions.
	COLUMN	The column-tab stops are used while ignoring the field attribute characters.
Term.ID	Up to 20 characters	The terminal ID (identification) is used by the host system to identify the display station.

Figure 2-3 (Part 3 of 3). Setup Parameters in the GENERAL Menu

COMMUNICATION Menu

Figure 2-4 shows the COMMUNICATION menu. Figure 2-5 on page 2-29 explains the setup parameters, their possible values, and their meanings.

Notes:

1. *RS-422A cannot be selected on some models (see "Models" on page 1-13).*
2. *The Line Control option cannot be selected when RS-422A is selected for the interface.*
3. *The Pacing option applies only to IBM 3101 emulation mode. Pacing is always set to on in IBM 3162 mode.*

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

GENERAL          COMMUNICATION          KEYBOARD/PRINTER          FUNCTION

Operating Mode              BLOCK   Interface                    RS-232C
Line Speed (bps)             9600   Line Control                    PRTS
Word Length (bits)              7   Break Signal (ms)                500
Parity                        ODD   Send Null Suppress               OFF
Stop Bit                        1   Pacing                           OFF
Turnaround Character          ETX
```

Figure 2-4. COMMUNICATION Menu

Setup Parameters	Possible Values	Meanings
Operating Mode	BLOCK	Data in the specified area is sent to the host system. This mode allows the operator to edit the data before sending it to the host system.
	ECHO	Data entered from the keyboard is sent only to the host system. The host system then returns the data to the 3162 for display on the screen.
	CHAR	Data entered from the keyboard is sent to the host system and at the same time displayed on the screen.
Line Speed	See page 2-37	The display station sends data to or receives data from the host system at the selected line speed (bps).
Word Length	7 | 8	The display station uses the selected word length (7-bit or 8-bit).
Parity	ODD EVEN NO SPACE MARK	The display station uses the selected parity. Parity is not added when NO is selected. The 3162 ignores a parity error when SPACE or MARK is selected.
Stop Bit	1 | 2	The display station places one or two bits after each data character.
Turnaround Character	ETX CR EOT	The display station generates an ETX (end of text), CR (carriage return), or EOT (end of transmission) character after each data stream when: • A read operation is requested from the host system • One of the Send, Send Line, Sn Msg, Function, PA, and Clear keys is pressed • The Reset key is pressed when the reset key attention is enabled • One of the Print, Print Line, Pr Msg keys is pressed when the print key attention is enabled.

Figure 2-5 (Part 1 of 3). Setup Parameters in the COMMUNICATION Menu

Setup Parameters	Possible Values	Meanings
Interface	RS-232C RS-422A	The display station communicates with the host system using the EIA RS-232C or RS-422A interface.
Line Control	PRTS	The display station controls the RS-232C signal line using PRTS (permanent request to send). PRTS handles the CTS (clear to send) and DSR (data set ready) as modem signals. This parameter is effective when RS-232C is selected for the interface on the full-duplex communication facility.
	IPRTS	The display station controls the RS-232C signal line using IPRTS (induced permanent request to send). IPRTS handles the CTS and DSR signals as if the signals were always on. This parameter is effective when RS-232C is selected for the interface on the full-duplex communication facility.
	CRTS	The display station controls the RS-232C signal line using the CRTS (controlled request to send). CRTS looks at the CTS, DSR and CD (carrier detect) signals to determine the status of the display station. The display station enters *contention mode* when the CTS signal is on. This mode changes to *sending mode* when data is being sent to the host system, and changes to *receiving mode* when the CD signal is on. This parameter is effective when RS-232C is selected for the interface on the half-duplex communication facility.
Break Signal	500	The display station sends a 500 ms break signal to the host system when the *Break* key is pressed.
	170	The display station sends a 170 ms break signal to the host system when the *Break* key is pressed.

Figure 2-5 (Part 2 of 3). Setup Parameters in the COMMUNICATION Menu

Setup Parameters	Possible Values	Meanings
Send Null Suppress	ON	The trailing null characters are not sent to the host system.
	OFF	The trailing null characters are replaced with space characters and sent to the host system.
Pacing (IBM 3101 Mode)	ON | OFF	When ON is selected and the receiving buffer of the display station becomes close to full, the display station sends the XOFF character to the host system. If the XOFF condition is removed, the display station sends the XON character to the host system.

Figure 2-5 (Part 3 of 3). Setup Parameters in the COMMUNICATION Menu

KEYBOARD/PRINTER Menu

KEYBOARD/PRINTER Menu

Figure 2-6 shows the KEYBOARD/PRINTER menu. Figure 2-7 on page 2-33 explains the setup parameters, their possible values, and their meanings.

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

GENERAL        COMMUNICATION        KEYBOARD/PRINTER        FUNCTION

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

Figure 2-6. KEYBOARD/PRINTER Menu

Setup Parameters	Possible Values	Meanings
Enter	RETURN	The *Enter* key works as the *Return* key.
	SEND	The *Enter* key works as the *Send* key.
Return	FIELD	The functions specified in the New Line option are performed when the *Return* key is pressed. However, if the target line is within a protected filed, the cursor moves to the first character position of the next unprotected field.
	NEW LINE	The functions specified in the New Line option are performed when the *Return* key is pressed.
New Line	CR	A CR (carriage return) character is generated when the *Return* key is pressed.
	CR/LF	Both the CR and LF (line feed) characters are generated when the *Return* key is pressed.
Send	PAGE	The display station sends the contents of the current page to the host system when the *Send* key is pressed, or sends the current line to the host system when the *Send Line* key is pressed.
	LINE	The display station sends the contents of the current line to the host system when the *Send* key is pressed or sends the contents of the current page to the host system when the *Send Line* key is pressed.
Insert Character	MODE	The display station enters insert mode when the *Insert* key is pressed.
	SPACE	A space character is inserted after the current cursor position when the *Insert* key is pressed.
Line Speed	See page 2-37	The display station receives data from or sends data to an optional device on the auxiliary port at the selected line speed (bps).
Word Length	7 | 8	The display station uses the selected word length (7-bit or 8-bit).

Figure 2-7 (Part 1 of 2). Setup Parameters in the KEYBOARD/PRINTER Menu

Setup Parameters	Possible Values	Meanings
Parity	ODD EVEN NO SPACE MARK	The display station uses the selected parity. Parity is not added when NO is selected. The 3162 ignores a parity error when SPACE or MARK is selected.
Stop Bit	1 | 2	The display station places one or two bits after each data character.
Characters	NATIONAL	The display station sends the alphanumeric characters (ASCII graphic characters) to the printer (optional device) when a print operation is requested. Other characters, such as the control characters, are replaced with the space characters and sent to the printer.
	ALL	The display station sends all characters (with control information to select the character set or character attribute, if necessary) to the printer (optional device) when a print operation is requested. If the printer can handle such information, all characters can be printed correctly (high-intensity, reverse, or underscore may be differently handled).

Figure 2-7 (Part 2 of 2). Setup Parameters in the KEYBOARD/PRINTER Menu

FUNCTION Menu

Figure 2-8 shows the FUNCTION menu. Figure 2-9 explains each function.

The 3162 has two storage areas for saving the setup-value definitions; VM (volatile memory) and NVM (non-volatile memory). The contents of VM are lost when the power is turned off; the contents of NVM are retained.

When you power-on the 3162 for the first time, NVM contains no values and factory-set, setup-value definitions are copied to VM. These are called *default* values and are used unless you redefine them.

When you power-on the 3162 after saving your setup-value definitions (in NVM), the contents of NVM are copied to VM. The 3162 operates **using the setup values in VM.** The contents of VM are immediately changed when you select the other setup value by pressing the *Space Bar* in the setup menus. When you perform the save function at this point, the contents of VM are copied to NVM enabling them to be used later.

Note: Setup-value definitions depend on the machine mode. You can independently save these definitions in NVM for the IBM 3162 or IBM 3101.

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

GENERAL        COMMUNICATION        KEYBOARD/PRINTER        FUNCTION

    Recall                Save                  Default

    Reset Terminal
```

Figure 2-8. FUNCTION Menu

If you select this field and press the space bar	this will occur
Recall	The contents of NVM are copied to VM. When the Machine Mode or Operating Mode option is changed, "Reset Terminal" is also performed. When the Row and Column option is changed, the screen is cleared.
Save	The setup-value definitions defined now and saved in VM are also saved in NVM.
Default	The setup-value definitions set in the factory (except the machine mode and terminal ID) are copied to VM. When the Machine Mode or Operating Mode option is changed, "Reset Terminal" is also performed. When the Row and Column option is changed, the screen is cleared.
Reset Terminal	The contents of NVM are copied to VM and the power-on reset (except checking the internal circuits) is performed.

Figure 2-9. Functions in the FUNCTION Menu

Circle the selected value for each parameter in the following list. This information will be the source used to define the setup values.

GENERAL

Machine Mode	IBM 3162* | IBM 3101
Screen	NORMAL* | REVERSE
Row and Column	24 x 80* | 28 x 80 | 24 x 132 | 28 x 132
Scroll	JUMP* | SMOOTH F | SMOOTH S | NO
Auto LF	ON* | OFF
Forcing Insert	OFF* | LINE | CHARACTER | BOTH
CRT Saver	OFF* | ON
Line Wrap	ON* | OFF
Tab	FIELD* | COLUMN
Term.ID (up to 20 characters)	_____

COMMUNICATION

Operating Mode	BLOCK* | ECHO | CHAR
Line Speed (bps)	50 | 75 | 110 | 134.5 | 150 | 200 | 300 | 600 | 1200 | 1800 | 2400 | 3600 | 4800 | 7200 | 9600* | 19200
Word Length (bits)	7* | 8
Parity	ODD* | EVEN | NO| SPACE | MARK
Stop Bit	1* | 2
Turnaround Character	ETX* | CR | EOT
Interface	RS-232C* | RS-422A
Line Control	PRTS* | IPRTS | CRTS
Break Signal (ms)	500* | 170
Send Null Suppress	ON* | OFF
Pacing**	OFF* | ON

KEYBOARD/PRINTER

Enter	RETURN* | SEND
Return	FIELD* | NEW LINE
New Line	CR* | CR/LF
Send	PAGE* | LINE
Insert Character	MODE* | SPACE
Line Speed (bps)	50 | 75 | 110 | 134.5 | 150 | 200| 300 | 600 | 1200 | 1800 | 2400 | 3600 | 4800 | 7200 | 9600* | 19200
Word Length (bits)	7* | 8
Parity	ODD* | EVEN | NO |MARK | SPACE
Stop Bit	1* | 2
Characters	NATIONAL* | ALL

* Indicates the default values (same values as set in the factory).
** The **Pacing** option applies only to IBM 3101 emulation mode; it is always set to on in 3162 mode.

Figure 2-10. Setup Parameters and Their Possible Values

How to Define Setup Values

This section describes how the setup menus are organized and how you can change the setup values through the menus.

Selecting a Menu

The GENERAL menu appears whenever you press the *Setup* key while holding down the *Ctrl* key. You can select the next menu by pressing the *Send* key. Each menu appears in the order shown in Figure 2-11. The current menu name appears in reverse video on the second line of each menu. To quit a menu without saving the definitions, press the *Setup* key while holding down the *Ctrl* key.

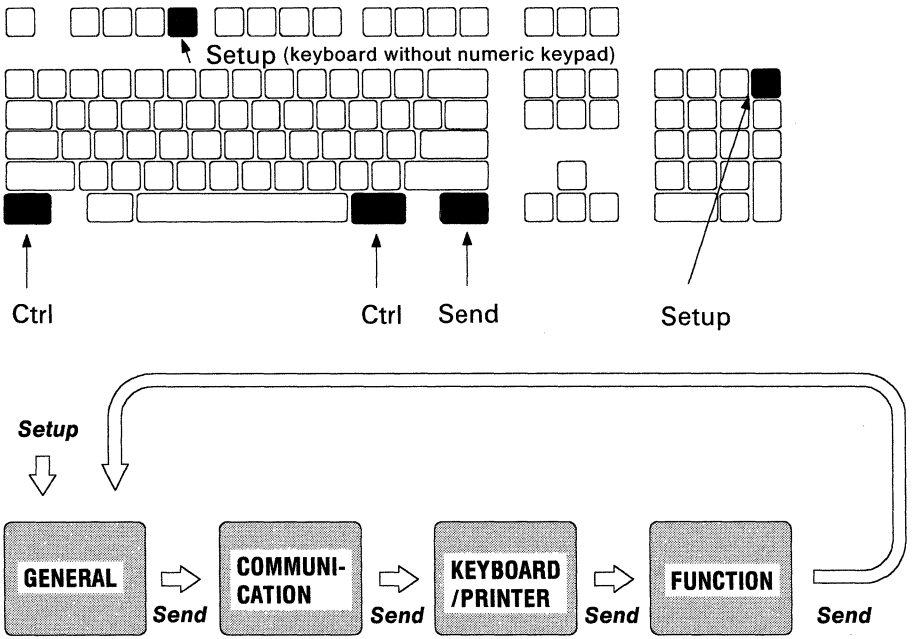


Figure 2-11. Selecting a Menu

Selecting a Field in the Menu

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

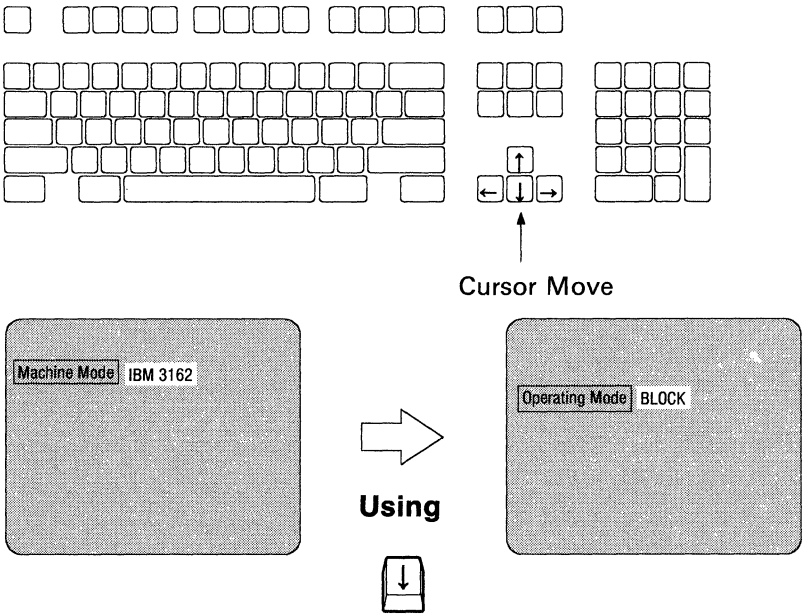


Figure 2-12. Selecting a Field

Selecting Values in the Fields

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

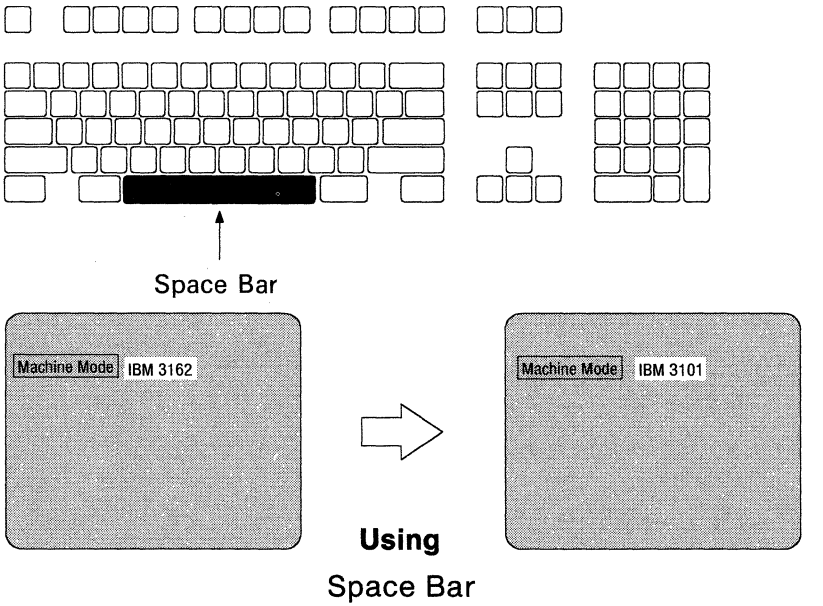


Figure 2-13. Selecting Values

Saving the Definitions

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

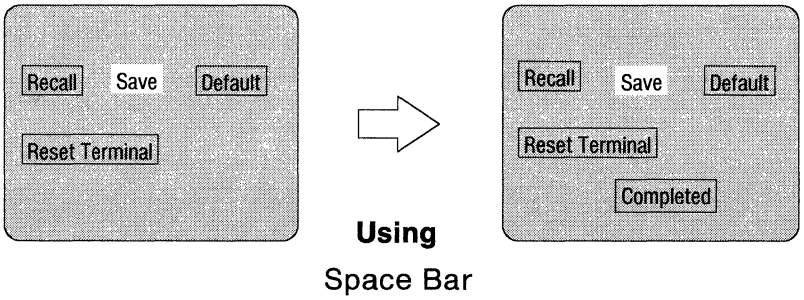


Figure 2-14. Saving the Definitions

Chapter 3. Understanding the Keyboard Functions

This chapter describes the function of each key. Figure 3-1 shows the layout of the 3162 keyboard with numeric keypad for the U.S. The keyboard includes alphanumeric keys, numeric keypad keys, and control-function keys. Shaded keys are the control-function keys.

The keyboard without the numeric keypad is also available in the U.S. However, you cannot use some keyboard functions (such as line drawing) with this keyboard. See "Keyboard Without Numeric Keypad" on page 3-20 for more information.

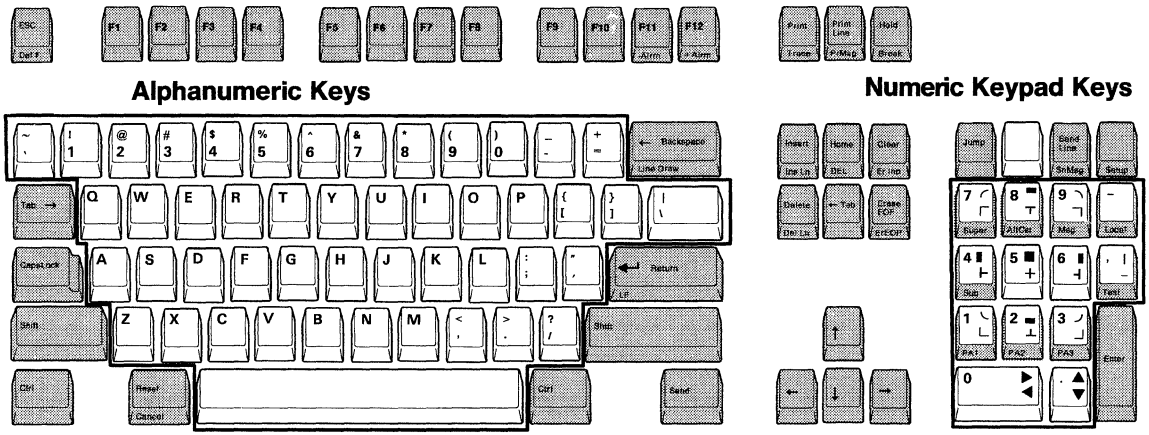


Figure 3-1. 3162 Keyboard

Alphanumeric Keys: Are used for entering:

- Alphabetic characters (A through Z)
- Numeric characters (0 through 9)
- Punctuation marks (such as , : ; ? !)
- Symbols (such as @ % $).

As on an ordinary typewriter, these keys repeat when they are pressed and held down.

When an alphabetic key is pressed alone, the corresponding lower-case character is displayed. When a number, symbol, or punctuation-mark key is pressed alone, the character on the lower half of the key is displayed.

To get the upper-case character, press the alphabetic key while holding down the *Shift* key or press the alphabetic key after pressing the *Caps Lock* key. To get the symbol or punctuation mark character on the upper half of the key, press the key while holding down the *Shift* key.

Numeric Keypad Keys: Are used for entering:

- Numeric characters
- Punctuation marks (- , .)
- Superscripts (^{0} through ^{9})
- Subscripts ($_{0}$ through $_{9}$)
- Line-drawing symbols (such as ▶ and ▲).

These keys, except the superscript and subscript keys, repeat when they are pressed and held down.

When a numeric keypad key is pressed alone, the number or the punctuation mark is displayed. To get a superscript character, press the *Super* key while holding down the Ctrl key; then press the number key. To get a subscript character, press the *Sub* key while holding down the Ctrl key; then press the number key.

The line-drawing symbols are unique to the 3162. They are on the right half of the numeric keypad keys. By pressing the *Line Draw* key while holding down the *Ctrl* key, the display station enters line-drawing mode. You can then use these symbols for drawing lines and making tables. Use the *Shift* key to select the symbol on the upper half of the key. By pressing the *Line Draw* key while holding down the *Ctrl* key again, the display station exits this mode.

Control-Function Keys: Other keys, called *control-function keys* in this guide, perform various 3162 functions. For example, the *Cursor Move* keys (↑ ← ↓ →) move the cursor in the direction of the arrow, or the *Setup* key enables the setup-value definitions to communicate with the host system. You can also select the cursor type using the *Alt Csr* key.

When a control-function key is pressed alone, the function labeled on the top of the key is performed. To get the function labeled on the front of the key, press the key while holding down the *Ctrl* key.

The 3162 provides two *Shift* and two *Ctrl* keys for ease of operation. Some control-function keys (such as the cursor move keys) repeat when they are pressed and held down. "What Each Key Does" on page 3-6 describes the functions of the control-function keys.

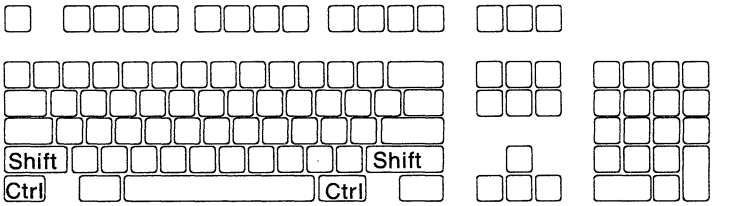
Some keyboard functions can be also performed by host commands. Some keys also generate an ASCII control character when used together with the *Ctrl* key (see "ASCII Control Characters" on page 3-19). These functions are described in *IBM 3162 ASCII Display Station Programmer's Guide and Reference Information.*

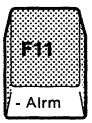
Where Each Key Is Located

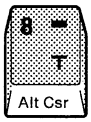
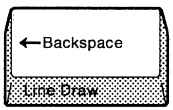
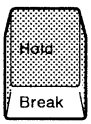
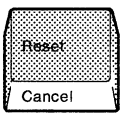
What Each Key Does

This section describes the function of each *control-function* key. Throughout this section, the left column shows an illustration of each key and the right column explains the function of the non-shaded part of the key. The function labeled on the top of the key is performed when the key is pressed alone. The function labeled on the front of the key is performed when the key is pressed while holding down the *Ctrl* key.

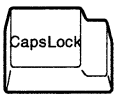
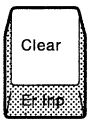
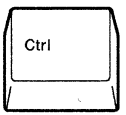
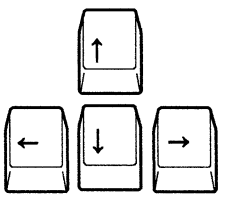
The functions of some keys depend on the option settings of host commands or setup-value definitions. See *IBM 3162 ASCII Display Station Programmer's Guide and Reference Information* for more information.

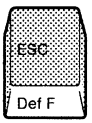
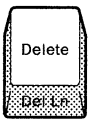
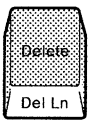


KEY	FUNCTION
− Alarm 	Decreases the volume of the audible alarm (the setting is saved for later use).
+ Alarm 	Increases the volume of the audible alarm (the setting is saved for later use).

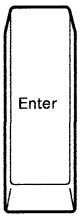
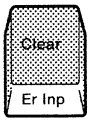
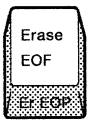
KEY	FUNCTION
Alternate Cursor 	Selects among four cursor types: block, blinking bar, blinking block, and bar. The selected cursor type is saved, and used the next time power is turned on.
← Backspace 	Moves the cursor to the left one position at a time.
Break 	Generates the break signal when the display station (1) uses PRTS or IPRTS for the line control and RS-232C for the interface, (2) uses RS-422A for the interface, or (3) operates in echo mode. Using this key, you can cause the host system to wait before sending data to the display station.
Cancel 	Ends data transfer to the host system or the optional device on the auxiliary port. Also resets the "KEYS LOCKED," "AUX NOT READY," or "AUX BUSY" conditions. Using this key, you can cancel either the print operation or the data transmission to the host system.

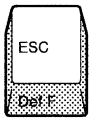
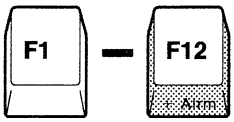
Keyboard Functions

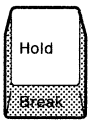
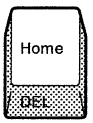
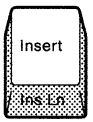
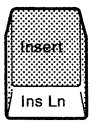
KEY	FUNCTION
Caps Lock 	Locks the keyboard in up-shift (for alphabetic keys only) mode. Pressing this key again resets up-shift mode.
Clear 	Erases all characters in the active page where the cursor is located, and moves the cursor to the first position of the page. Also clears the field attributes and the tab stops, and resets insert mode.
Control 	Selects the function indicated on the front of the other selected keys.
Cursor Move 	Moves the cursor in the direction of the arrow.

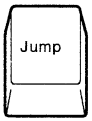
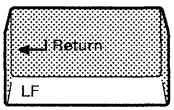
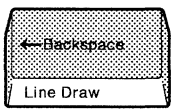
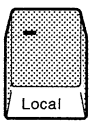
KEY	FUNCTION
Define Function 	Enters define-function-key mode. See "Defining Function Keys" on page 2-18 on how to define function keys.
DEL 	In character or echo mode, the display station sends an ASCII DEL character to the host system.
Delete 	Deletes the character in an unprotected field or in an unformatted page at the current cursor position. If the cursor is located at an attribute character or in a protected field, the audible alarm sounds and WRONG PLACE appears at the bottom of the screen.
Delete Line 	Deletes the line where the cursor is located. If an attribute character exists in the current line, or if the current field is protected, the audible alarm sounds and WRONG PLACE appears at the bottom of the screen.

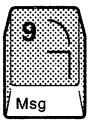
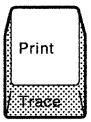
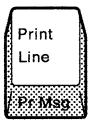
Keyboard Functions

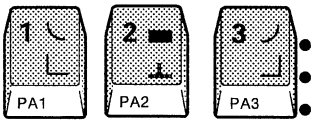
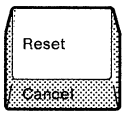
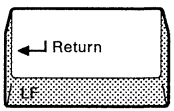
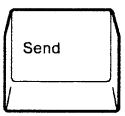
KEY	FUNCTION
Enter 	Works as the *Send* key when SEND is selected or works as the *Return* key when RETURN is selected for the Enter option.
Erase Input 	Erases all characters in the active page and moves the cursor to the first position when the page is unformatted. Erases all unprotected characters in the active page and moves the cursor to the first position of the first unprotected field when the page is formatted.
Erase to End of Field 	Erases all characters from the cursor position to the end of the line when the page is unformatted. Erases all characters from the cursor position to the end of the line or to the end of the field, whichever comes first, when the page is formatted. If the cursor is located at a field attribute character or in a protected field, the audible alarm sounds and WRONG PLACE appears at the bottom of the screen.

KEY	FUNCTION
Erase to End of Page 	Erases all characters from the cursor position to the end of the page when the page is unformatted. Erases all unprotected characters from the cursor position to the end of the page when the page is formatted.
Escape 	Generates an ASCII ESC character. The ESC character followed by appropriate alphanumeric characters forms an ESC sequence, which provides unique 3162 functions in addition to the standard ASCII control functions.
Function (F1 - F12) 	Sends an ESC sequence to the host system or generates a character string that is assigned to each function key. Works as F13 through F24 when pressed with the *Shift* key. See "Defining Function Keys" on page 2-18 for defining function keys. If you have not redefined a function key, the default ESC sequence is generated.

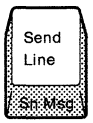
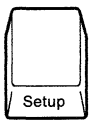
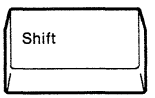
KEY	FUNCTION
Hold Screen 	Stops the screen from being updated by the host system during normal operation. The incoming data will be stored in the display station. If the display station's data buffer becomes close to full, an XOFF character will be sent to the host system. Pressing this key again starts the screen update.
Home 	Moves the cursor to the home position (first unprotected character position) of the active page.
Insert 	Places the keyboard in insert mode and allows characters to be inserted in a field when MODE is selected, or inserts a space character when SPACE is selected for the Insert Character option. Pressing this key again or pressing the *Reset* key exits insert mode. If there is no space to insert a character (when the Forcing Insert option is OFF) or the cursor is in a protected field, the audible alarm sounds and WRONG PLACE appears at the bottom of the screen.
Insert Line 	Inserts a null line where the cursor is located. If there is no space to insert a line (when the Forcing Insert option is OFF), or the cursor is in a protected field, or an attribute character exists in the current line, the audible alarm sounds and WRONG PLACE appears at the bottom of the screen.

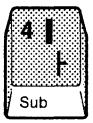
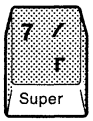
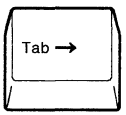
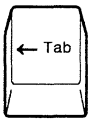
KEY	FUNCTION
Jump Partition 	Moves the cursor to the next partition.
Line Feed 	Moves the cursor to the first character of the next line when New Line is selected, or moves the cursor to the same position of the next line when Line Feed is selected for the ASCII LF Character option (Set Control 3 command).
Line Draw 	Enters line-drawing mode. Enables the numeric keypad for line drawing. Pressing this key again exits this mode. See page 3-3 for more information.
Local 	Enters local mode, in which almost all communications with the host system are disabled. Pressing this key again exits local mode.

KEY	FUNCTION
Message 	Each time the *Msg key* is pressed, the contents of the operator information area (OIA) change. At first the OIA contains no indicators; the first time the *Msg* key is pressed, operator messages appear; the next time the *Msg* key is pressed, host messages appear. The contents of the OIA are saved for later use.
Print 	Sends the contents of the current page to the optional device on the auxiliary port. Sends the contents of the screen when pressed together with the *Shift* key. The data to be sent depends on the Characters option. See page 2-34 for more information. Sends the Print (or Print Screen) AID followed by an LTA to the host system if the print key attention is enabled.
Print Line 	Sends the contents of the current line to the optional device on the auxiliary port. The data to be sent depends on the Characters option. See page 2-34 for more information. Sends the Print Line AID followed by an LTA to the host system if the print key attention is enabled.
Print Message 	In block mode, the display station sends data from the line below the send mark (⌂) to the cursor position, to the optional device on the auxiliary port. The send mark can be specified by pressing the *ESC* key; then pressing the *E* key while holding down the *Shift* key. If no send mark is specified, data from the top of the screen to the cursor position is sent. The data to be sent depends on the Characters option. See page 2-34 for more information. Sends the Print Message AID followed by an LTA to the host system if the print key attention is enabled.

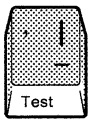
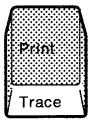
KEY	FUNCTION
Program Access 	Sends one of the following ESC sequences to the host system: • ESC ! m (PA1) • ESC ! n (PA2) • ESC ! o (PA3)
Reset 	Resets superscript, subscript, and insert modes. Also removes the error indications displayed at the bottom of the screen. Sends the Reset AID followed by an LTA to the host system when the reset key attention is enabled.
Return 	Moves the cursor to the first character of (1) the current line, (2) the next line, or (3) the line after the next line, depending on the AUTO LF and NEW LINE options.
Send 	In block mode, the display station sends the contents of the active page to the host system when PAGE is selected, or sends the contents of the current line to the host system when LINE is selected for the Send option. The data to be sent depends on the Send Data Format option. In character or echo mode, the display station sends the Send AID followed by an LTA to the host system.

Keyboard Functions

KEY	FUNCTION
Send Line 	In block mode, the display station sends the contents of the current line to the host system when PAGE is selected, or sends the contents of the current page to the host system when LINE is selected for the Send option. The data to be sent depends on the Send Data Format option. In character or echo mode, the display station sends the Send Line AID followed by an LTA to the host system.
Send Message 	In block mode, the display station sends data from the line below the send mark (⏏) to the cursor position to the host system. The send mark can be specified by pressing the *ESC* key; then pressing the *E* key while holding down the *Shift* key. If no send mark is specified, data from the top of the screen to the cursor position is sent. The data to be sent depends on the Send Data Format option. In character or echo mode, the display station sends the Send Message AID followed by an LTA to the host system.
Setup 	Enters setup mode to define the setup values. See "Defining Setup Values" on page 2-15 for more information.
Shift 	Enables keyboard up-shift.

KEY	FUNCTION
Subscript 	Allows subscripts ($_{0}$ - $_{9}$) to be entered when used together with the numeric keys.
Superscript 	Allows superscripts (^{0} - ^{9}) to be entered when used together with the numeric keys.
Tab → 	Moves the cursor to the next column tab stop when the page is unformatted. Moves the cursor to the first character of the next unprotected field when FIELD is selected for the Tab option and the page is formatted. Moves the cursor to the next column tab when COLUMN is selected for the Tab option and the page is formatted. Works as the ← *Tab* key when pressed with the *Shift* key.
←Tab (Back Tab) 	Performs the same operation as the *Tab* → key, except the direction (*previous* instead of next).

Keyboard Functions

KEY	FUNCTION
Test 	**Warning:** Do not press the *Test* key during on-line operation; data could be lost. Enters test mode and a test pattern appears. In this mode, you can check the keyboard using the test pattern. See *IBM 3162 ASCII Display Station Problem Solving Guide* for more information. Pressing this key again causes the display station to exit test mode while initializing the display station.
Trace 	Enters trace mode. In trace mode, data from the host system is transferred to the optional device on the auxiliary port without data conversion while displaying the same data on the screen. Pressing this key again exits trace mode.

ASCII Control Characters

ASCII control characters can be generated by pressing the selected alphanumeric key while holding down the *Ctrl* key. The ASCII control character generated by each alphanumeric key is shown on the front of the key in Figure 3-2.

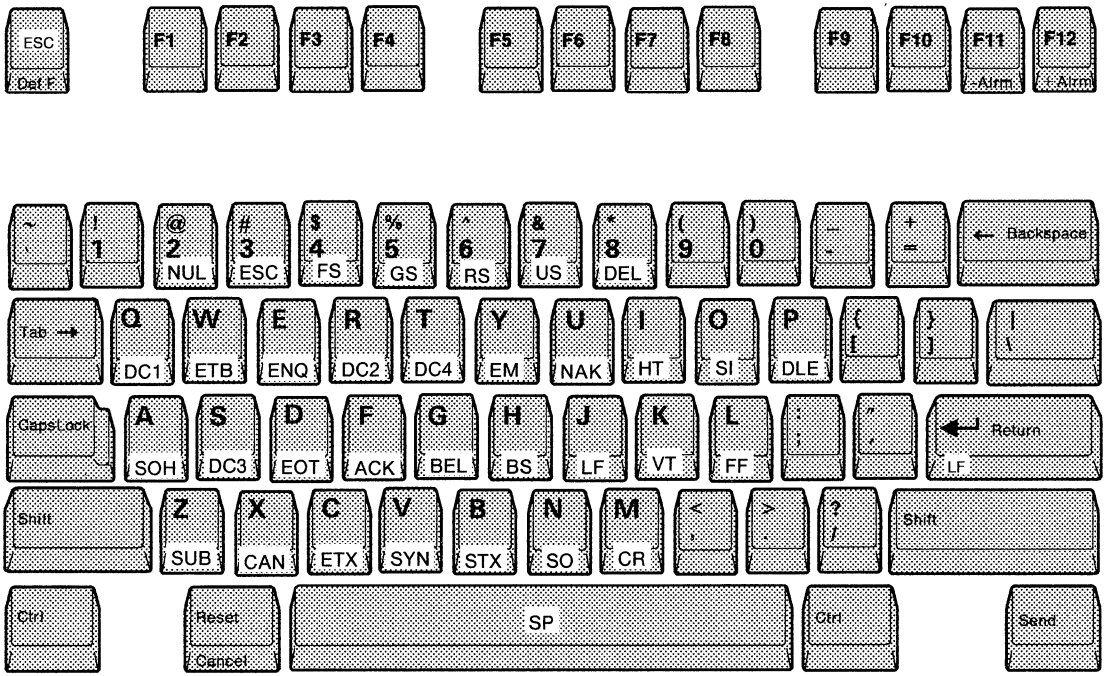


Figure 3-2. ASCII Control Character Generating Keys

The ESC or LF character can also be generated by the *ESC* key or the *Return* key with the *Ctrl* key, respectively.

Keyboard Without Numeric Keypad

Figure 3-3 on page 3-21 shows the layout of the 3162 keyboard without numeric keypad for the U.S. Some keyboard functions on the 3162 numeric keypad keys are not available or are in a different location.

Keyboard functions not available are:

- Line drawing
- Super
- Sub
- Enter.

Keyboard functions moved to a different location are:

- PA1 - PA3
- Setup
- Jump
- Sn Msg
- Send Line
- Alt Csr
- Msg
- Local
- Test.

  Test is not printed on the actual key cap. By pressing the *Hold* key while holding down the *Ctrl* and *Shift* keys causes the display station to enter test mode.

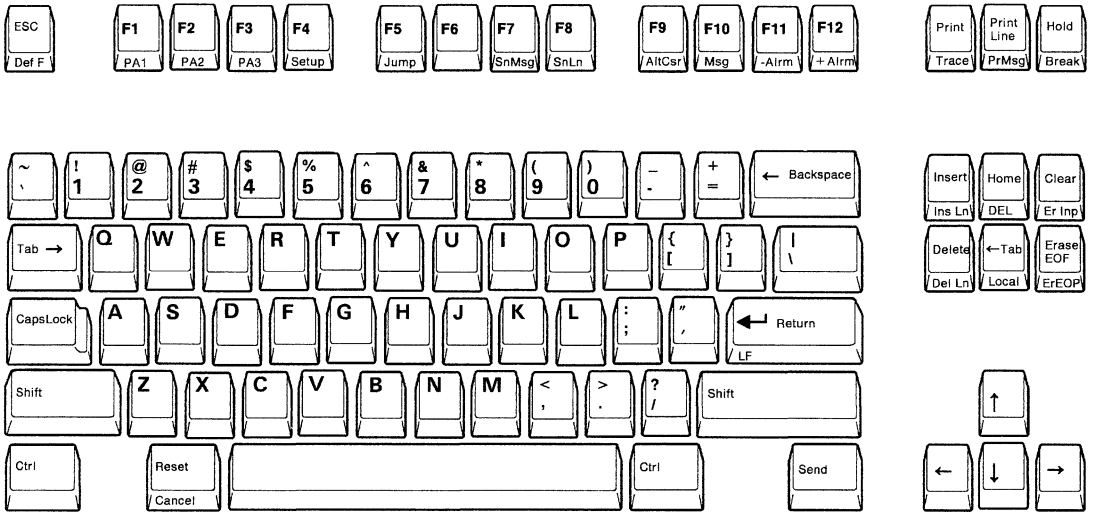


Figure 3-3. 3162 Keyboard Without Numeric Keypad

Chapter 4. Interpreting Operator Messages

This chapter describes the messages displayed at the bottom of the screen (operator information area). This area is used to display:

- The operating status of the display station
- The communication status
- Warning messages if a problem is detected
- Host messages.

Messages are displayed in predefined areas depending on their type. Figure 4-1 on page 4-2 shows the operator information area and Figure 4-2 on page 4-2 explains what the operator messages are, what they mean, and what action, if any, is required for each.

Notes:

1. *The operator information are is not displayed when you power-on the display station the first time after installation. You can turn on the indication of this area by pressing the* ***Msg*** *key while holding down the* ***Ctrl*** *key.*

2. *Host messages sent from the host system can also appear in this area by replacing the previous indication. You can select the indication of this area, that is, to display the operator message or the host message, or to turn off the indication, using the* ***Msg*** *key.*

3. *The operator information area is also used to display one-line menus for defining setup values and function keys.*

4. *If two or more messages exist in each area, the message with the higher priority is displayed. Messages in area* **3** *are displayed in the following order:*

   a. PROBLEM IN LOGIC ELEMENT
   b. PROBLEM IN LOGIC ELEMENT OR KEYBOARD
   c. PROBLEM IN KEYBOARD
   d. COMM NOT READY 2
   e. COMM NOT READY 1
   f. AUX NOT READY
   g. HOST BUSY
   h. AUX BUSY
   i. HOLD SCREEN
   j. SENDING
   k. RECEIVING
   l. PRINTING
   m. KEYS LOCKED
   n. INVALID KEY
   o. WRONG PLACE
   p. KEYBOARD ERROR
   q. NUMERIC.

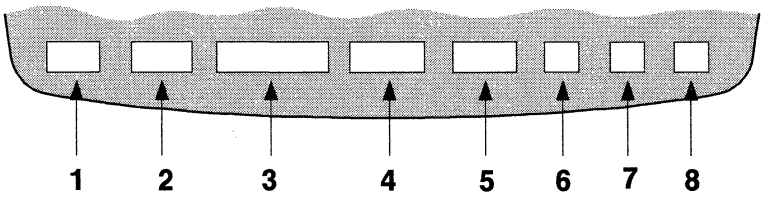


Figure 4-1. Operator Information Area

Area	Message	Meaning	Action
1	BLOCK CHAR ECHO LOCAL TEST	Shows the current operating mode.	None.
2	TRANSP	Shows that the display station is in transparent mode.	To exit transparent mode, press the *P* key while holding down the *Ctrl* key; then press the *C* key while holding down the *Ctrl* key.
3	AUX BUSY	Appears when an XOFF condition occurs at the optional device on the auxiliary port.	Wait. This message disappears when the XOFF condition is removed. *Note:* This message also disappears if you press the *Cancel* key, but any remaining data is discarded.
	AUX NOT READY	Appears when an operator or an application program tries to send data to the optional device on the auxiliary port while the optional device is not ready to operate (DTR signal of the optional device is off).	This message disappears when (1) the optional device becomes ready or (2) you press the *Cancel* key. Check the optional device (such as power). If the message appears again, see *IBM 3162 ASCII Display Station Problem Solving Guide.*

Figure 4-2 (Part 1 of 6). Operator Messages

Area	Message	Meaning	Action
3	COMM NOT READY 1	Appears when the CTS (clear to send) signal is not sent from the host system (or modem) while the DTR (data terminal ready) signal is turned on and the DSR (data set ready) signal is present on the main port. *Note:* This message does not appear if both RS-232C and PRTS (or CRTS) are not selected for the Interface and Line Control, respectively, in the COMMUNICATION menu.	See *IBM 3162 ASCII Display Station Problem Solving Guide.*
	COMM NOT READY 2	Appears when the DTR signal is turned on and the DSR signal is not present on the main port. *Note:* This message does not appear if both RS-232C and PRTS (or CRTS) are not selected for the Interface and Line Control, respectively in the COMMUNICATION menu.	See *IBM 3162 ASCII Display Station Problem Solving Guide.*

Figure 4-2 (Part 2 of 6). Operator Messages

Area	Message	Meaning	Action
3	HOLD SCREEN	Shows that the screen update is suspended when the *Hold* key is pressed.	To release the hold-screen status, press the *Hold* key again.
	HOST BUSY	Appears when an XOFF condition occurs at the host system.	Wait. The message disappears when the display station receives an XON character.
	INVALID KEY	Appears when you press any invalid key.	Press any valid key.
	KEYBOARD ERROR	Appears when any key is pressed and a keyboard scan code error or keyboard overrun occurs.	Retry the operation.
	KEYS LOCKED	Appears when the keyboard is locked by the Keyboard Lock command.	None. This status is cleared by the Keyboard Unlock command or when you press the *Cancel* key.
	NUMERIC	The cursor is located in an unprotected numeric field.	None.
	PRINTING	Shows that data is being sent to the optional device on the auxiliary port.	None.

Figure 4-2 (Part 3 of 6). Operator Messages

Area	Message	Meaning	Action
3	PROBLEM IN KEYBOARD	Shows that a problem was detected in the keyboard.	See *IBM 3162 ASCII Display Station Problem Solving Guide.*
	PROBLEM IN LOGIC ELEMENT	Shows that a problem was detected in the logic element.	See *IBM 3162 ASCII Display Station Problem Solving Guide.*
	PROBLEM IN LOGIC ELEMENT OR KEYBOARD	Shows that a problem was detected in the logic element or keyboard.	See *IBM 3162 ASCII Display Station Problem Solving Guide.*
	RECEIVING	Shows that data is being received from the host system. *Note:* This message does not appear if both RS-232C and CRTS are not selected for the Interface and Line Control, respectively, in the COMMUNICATION menu.	None.
	SENDING	Shows that data is being sent to the host system.	None.
	WRONG PLACE	Appears when you press any invalid key in a protected field or on a field attribute character position. It also appears when you try to insert a character or line where there is no space (Forcing Insert option is OFF).	None.

Figure 4-2 (Part 4 of 6). Operator Messages

Area	Message	Meaning	Action
4	INSERT	Shows that insert mode is selected when the *Insert* key is pressed or by the Insert Character command. *Note:* This message does not appear if MODE is not selected for the Insert Character in the KEYBOARD/PRINTER menu.	To exit this mode, press the *Insert* or *Reset* key.
5	CAPS	Shows that caps-lock mode is selected when the *Caps Lock* key is pressed.	To exit this mode, press the *Caps Lock* key again.
	CONTROL	Appears when the *Ctrl* key is pressed and held down.	None.
	SUBSCRIPT	You can enter a subscript character.	None. To quit without entering a subscript character, press the *Reset* key.
	SUPERSCRIPT	You can enter a superscript character.	None. To quit without entering a superscript character, press the *Reset* key.
	UP SHIFT	Appears when the *Shift* key is pressed and held down.	None.

Figure 4-2 (Part 5 of 6). Operator Messages

Area	Message	Meaning	Action
6	DRAW	Shows that line-drawing mode is selected when the *Line Draw* key is pressed.	To exit this mode, press the *Line Draw* key again.
7	TRACE	Shows that trace mode is selected when the *Trace* key is pressed or by the Trace On command.	To exit this mode, press the *Trace* key again.
8	(xxx,yyy)	*xxx* and *yyy* indicate the row and column addresses of the cursor, respectively.	None.

Figure 4-2 (Part 6 of 6). Operator Messages

Appendix A. Emulating the IBM 3101 Display Terminal

The 3162 can emulate the IBM 3101 Models 23 and 881 by selecting IBM 3101 for the Machine Mode in the GENERAL menu. See "Defining Setup Values" on page 2-15 for instructions. You can also select IBM 3101 mode by the Set Control 1 command. See *IBM 3162 ASCII Display Station Programmer's Guide and Reference Information* for more information. You can run the same application programs that were running the IBM 3101 Models 23 and 881.

This appendix describes the IBM 3101 functions that are *different* or *not* supported when operating in emulation mode. It also describes the *additional* functions. Other IBM 3101 functions work as they normally do in the IBM 3101.

This appendix is for those who want to use a 3162 as an IBM 3101. It provides the necessary information to operate the 3162 only in IBM 3101 emulation mode. You should already have a basic understanding of the IBM 3101. You may require *IBM 3101 Display Terminal Description*, GA18-2033 for reference.

Functions Supported Differently in Emulation Mode

The following figure shows which IBM 3101 functions to be emulated are different and how they are different.

IBM 3101 Function	Emulation Mode
Setup Switches	Replaced with the setup menus. You can define the Pacing option in addition to all 3162 setup values. See "Setup Menus and Setup Value Descriptions" on page 2-22 for more information.
Keyboard Layout	Figure A-2 on page A-3 shows an IBM 3101 emulation keyboard.
Key Labels	Some labels on the keys are printed differently. See Figure A-3 on page A-4.
Operator Messages	Some messages are displayed in different words. See Figure A-4 on page A-5.
Displayed Characters	Shapes of the following characters are different: • DC1 • DC2 • DC3 • DC4 • Send mark (⏏). A SUB character is converted to a reverse question mark (⸮).

Figure A-1 (Part 1 of 2). Functions Supported Differently in Emulation Mode

IBM 3101 Function	Emulation Mode
Turnaround Characters	DC3 cannot be used as a turnaround character. DC3 is used as an XOFF character in the 3162.

Figure A-1 (Part 2 of 2). Functions Supported Differently in Emulation Mode

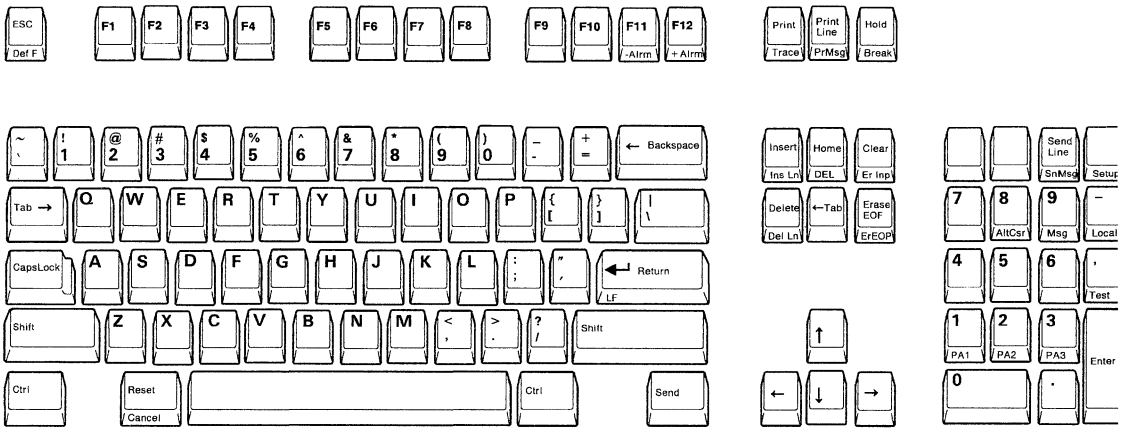


Figure A-2. IBM 3101 Emulation Keyboard

Note: Some labels of the keys are printed differently on the actual keyboard.

Key Labels

The following figure shows the IBM 3101 keys and their equivalent keys in emulation mode.

IBM 3101 Keys	Equivalent Keys in Emulation Mode
ALT	Ctrl
DEL CHAR	Delete
DEL LINE	Del Ln
ERASE EOL/EOF	Erase EOF
ERASE EOS	Erase EOP
ERASE INPUT	Er Inp
INS CHAR	Insert
INS LINE	Ins Ln
PF1 - PF8	F1 - F8
PRINT MSG	Pr Msg
SEND MSG	Sn Msg
	Caps Lock
	Shift
	Return

Figure A-3. Equivalent Keys

Operator Messages

The following figure shows the IBM 3101 operator messages and their equivalent messages in emulation mode.

IBM 3101 Operator Messages	Operator Messages in Emulation Mode
CHAR MODE	CHAR or ECHO
BLOCK MODE	BLOCK
(XPARENT)	TRANSP
(PROGRAM)	Not applicable
(IN ATTR)	Not applicable
LINE CHECK 1	COMM NOT READY 1
LINE CHECK 2	COMM NOT READY 2
SYSTEM NOT READY	HOST BUSY
RE-KEY	KEYBOARD ERROR
SYSTEM COMMAND	KEYS LOCKED
PRINTING	PRINTING
SENDING	SENDING
DISABLED KEY	INVALID KEY
MODE/SETUP CHECK	INVALID KEY
FORMAT CHECK	WRONG PLACE
INSERT	INSERT
UP SHIFT	UP SHIFT
S	SENDING
R	RECEIVING
LOCAL	LOCAL
AUX ON	TRACE

Figure A-4. Equivalent Operator Messages

Functions Not Supported in Emulation Mode

The following functions are not supported in emulation mode:

- Keyboard functions
  - ATTR
  - AUX
  - PRGM MODE
  - 
- Hardware trace.

Additional Functions in Emulation Mode

The 3162 provides the following additional functions:

- Large-screen support (28 lines of 132 characters)

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

- Smooth scrolling
- Pacing
- Keyboard functions.

Additional Keyboard Functions

You can use the following additional keyboard functions in emulation mode. See Chapter 3, "Understanding the Keyboard Functions" on page 3-1 for the function of each key. When you use the 3162 functions, which are not listed here but shown on the actual keyboard, the audible alarm will sound.

- + Alrm
- − Alrm
- Alt Csr
- Def F
- Enter
- F9 - F24
- Hold
- Msg (turns the OIA indication on or off)
- PA1 - PA3
- Setup
- Test
- Trace.

Summary of Commands in IBM 3101 Emulation Mode

Command	Function
ESC 0	Set Tab
ESC 1	Clear Tab
ESC 2	Back Tab
ESC 3 `pa`	Start Field
ESC 5 ESC 5 `pr pc` (response)	Read Cursor Address
ESC 6 ESC 6 `pa1 pa2` (response)	Read Status
ESC 7 ESC 7 `pa1 pa2` (response)	Read Setup Switch
ESC 8	Read Buffer
ESC 9 `pa`	Set Control
ESC SP 9 `pa`	Set Control 1 (new command)
ESC A	Cursor Up
ESC B	Cursor Down
ESC C	Cursor Right
ESC D	Cursor Left
ESC E	Write Send Mark
ESC H	Cursor Home
ESC I	Erase EOF/EOL
ESC J	Erase EOS
ESC K	Erase Input
ESC L	Clear All
ESC N	Insert Line

Command	Function
ESC O	Delete Line
ESC P	Insert Character
ESC Q	Delete Character
ESC S	Cancel
ESC U	Print Line
ESC V	Print Message
ESC W	Print Page
ESC X `pr pc`	Set Buffer Address
ESC Y `pr pc`	Set Cursor Address
ESC Z	Insert Cursor
ESC :	Lock Keyboard
ESC ;	Unlock keyboard

Legend:

ESC:	Escape character
SP:	Space character
`pa1, pa2`, etc.:	Parameter

IBM 3101 Emulation

Glossary

This glossary defines terms and abbreviations that are used in this guide. It also includes terms and definitions from *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, GC20-1699, as well as developed by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO). This material is reproduced in part from the *American National Dictionary for Information Processing*, Copyright 1977, by the Computer and Business Equipment Manufactures Association, copies of which may be purchased from the American National Standards Institute, 1430 Broadway, New York, NY 10018. Definitions from published sections of *ISO Vocabulary of Data Processing* are identified by the symbol "(ISO)" preceding the definition.

The symbols "(TC95)" and "(TC97)" at the beginning of a definition indicate that the definition is reproduced from a working document or draft proposal of ISO Technical Committee 95 (Office Machines) or ISO Technical Committee 97, Subcommittee 1 (Data Processing) and the final agreement has not yet been reached among its participating members.

ANSI definitions are preceded by an asterisk. An asterisk placed to the left of the term indicates that the entire definition is taken from the *American National Dictionary for Information Processing*; where definitions from other sources are included in the entry, ANSI definitions are identified by an asterisk to the right of the item number.

A

active page. The page in which the cursor is located.

active partition. The partition in which the cursor is located.

AID. Attention identifier.

application program. A program written for or by a user that applies to the user's work.

*** ASCII.** American National Standard Code for Information Interchange. The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

ASCII control characters. Deprecated term for American National Standard control characters.

attention identifier (AID). A code that is sent to the host system when the selected key is pressed. An AID is unique to the key.

attribute. See display attribute.

Glossary

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

auxiliary port. A port that is used to communicate with the optional device (such as a printer).

B

binary digit. (1) * (ISO) In binary notation, either of the characters 0 or 1. (2) Synonymous with bit.

bit. Synonym for binary digit.

block mode. A method of transmitting data in groups of bits or characters as a unit (block). See also character mode and echo mode.

bps. Bits per second. In serial transmission, the instantaneous bit speed with which a device or channel transmits a character.

buffer. (1) * A routine or storage used to compensate for a difference in the rate of flow of data, or time of occurrence of events, when transferring data from one device to another. (2) A portion of storage for temporarily holding input or output data.

byte. (1) * A binary character operand upon as a unit and usually shorter than a computer word. (2) The representation of a character.

C

cartridge. An element that stores the program to operate the IBM 3162 in emulation mode.

CD. Carrier detect.

character. A language unit composed of bits, for example, a letter, number, or special symbol, such as an asterisk or question mark.

character mode. A method of transmitting data one character at a time, rather than by blocks and at the same time displaying it on the screen. See also block mode and echo mode.

COMMUNICATION menu. One of the setup menus that is used to define the 3162 setup parameters concerning the communications with the host system.

contention. (1) (TC97) A condition arising when two or more data stations attempt to transmit at the same time over a shared channel, or when two data stations attempt to transmit at the same time in two-way alternate communication. (2) A line-control scheme in which stations on a line compete for the use of that unused line; the station that is successful in gaining control of the line is able to transmit.

CR. Carriage return.

CRT. Cathode ray tube.

CRTS. Controlled request to send.

CTS. Clear to send.

current field. A field in which the cursor is located.

current line. A line on which the cursor is located.

cursor. (1) (TC97) In computer graphics, a movable marker that is used to indicate a position on a display surface. (2) (TC95) A displayed symbol that acts as a marker to help the user locate a point in text, in a system command, or in storage. (3) A movable spot of light on the screen of the display device, usually indicating where the next character will be entered, replaced, or deleted.

D

data. Information that is digital in form when processed by a computer.

data stream. All data transmitted through a communication line in a single operation.

default. An alternative value, attribute, or option that is assumed when none has been specified.

display attribute. (TC97) In computer graphics, a particular property that is assigned to all or part of a display; for example, low intensity, green color, blinking status.

DSR. Data set ready.

DTR. Data terminal ready.

E

echo mode. A method of transmitting data one character at a time, rather than by blocks. The host system then returns data for display on the screen. See also block mode and character mode.

ESC (escape) sequence. A character string that begins with the ESC character. See also host command.

EIA. Electronic Industry Association

EIA RS-232C. An Electronic Industry Association (EIA) communications interface standard.

EIA RS-422A. An Electronic Industry Association (EIA) communications interface standard.

emulation. (1) (TC97) The imitation of all or part of one computer system by another, primarily by hardware, so that the imitating computer system accepts the same data, executes the same programs, and achieves the same results as the imitated computer system. (2) The use of programming techniques and special machine features to permit a computing system to execute programs written for another system.

EOT. End of transmission.

ETX. End of text.

F

field. An area that consists of a field attribute and the data following it. See also field attribute.

field attribute. A control character stored in the character buffer in the first character position of a field. A field attribute defines the characteristics (such as high-intensity and blinking) of the field.

field tab. A function that advances the cursor to the first character position of the next unprotected field, if it exists.

formatted page. A page in which one or more fields have been defined by an application program. Contrast with unformatted page.

full duplex. A method of transmission in which both stations can receive and transmit simultaneously.

function key. See program function key.

FUNCTION menu. One of the setup menus that is used, for example, to save the definitions that are made on the other menus.

G

GENERAL menu. One of the setup menus that is used to define the 3162 setup parameters (such as machine mode and terminal ID).

H

half duplex. A method of transmission in which signals can go in both directions, but in only one direction at any given time.

home position. A first unprotected character position in a screen or partition.

host command. A character string that is sent from the host system or entered from the keyboard to control the terminal's functions.

host system. (1) A data processing system that is used to prepare programs and the operating environments for use on another computer or controller. (2) The data processing system to which a network is connected and with which the system can communicate.

host message. A message defined by an application program and displayed in the bottom of the screen using the message (Msg) key.

I

IBM marketing representative. The person who represents IBM and who takes your order.

IBM service representative. An individual who provides field service for IBM products (for example, field maintenance of IBM hardware).

interface. A shared boundary defined by functional characteristics, common physical interconnection characteristics, signal

characteristics, and other characteristics, as appropriate.

IPRTS. Induced permanent request to send.

K

KEYBOARD/PRINTER menu. One of the setup menus that is used to define the 3162 setup parameters concerning the keyboard operations and the communications with the optional device on the auxiliary port.

L

line-drawing symbols. The symbols that are on the right half of the numeric keypad keys. They are used for drawing lines and making tables.

line speed. The transmission speed of digital signals, usually calculated in bits per second. Also called baud rate.

local mode. A mode in which communications with the host system are disabled.

LTA. Line turnaround character.

M

main port. A port that is used to communicate with the host system.

modem. (1) * (modulator-demodulator) A device that modulates and demodulates signals transmitted over data communication facilities. (2) (TC97) A functional unit that modulates and demodulates signals. One of the functions of a modem is to enable digital data to be transmitted over analog transmission facilities.

N

null character (NUL). (ISO) A control character that is used to accomplish media-fill or time-fill, and that may be inserted into or removed from, a sequence of characters without affecting the meaning of the sequence; however, the control of equipment or the format may be affected by this character.

numeric keypad. A set of keys, located at the right side of the keyboard, that can be used to enter numbers and line-drawing symbols.

NVM. Non-volatile memory.

O

OIA. Operator information area.

online. Pertaining to a user's access to a computer via a terminal or to terminal equipment connected to a transmission line in direct communication action over the line with another terminal or with a computer.

operator information area. The screen area on the bottom line of the screen where messages are displayed to define the status of the terminal or system to the operator.

operator message. A message, displayed in the operator information area, that informs an operator of the operating status of the 3162.

option. See setup parameter.

optional device. A device that is connected to the auxiliary port.

P

pacing. A technique by which a receiving station controls the rate of transmission of a sending station to prevent overrun.

page. * A block of data. The 3162 allows only one page to be contained in each partition, therefore, a partition and a page represent the same thing. See partition.

parameter. (1) * (ISO) A variable that is given a constant value for a specified application and that may denote the application. (2) A variable that is given a constant value for a specific document program instruction.

partition. All or a portion of the screen area of a display space and its buffer. Data is presented within the partition through a viewport that is defined when the partition is created. Each viewport has an independent partition.

printer. A device that writes output data from a system on paper or other media.

program. A set of actions or instructions that a machine is capable of interpreting and executing.

program access (PA) key. A key on the keyboard of a display device that produces an interruption to solicit program action.

program function (F1 -F24) key. A key on the keyboard of a display device that passes a signal to a program to call for a particular program operation.

protected field. On a display device, a display field in which the user cannot enter, modify, or erase data from the keyboard. Contrast with unprotected field.

PRTS. Permanent request to send.

R

reverse video. A means of highlighting a character or a field by reversing the light intensity between the character and its background; for example, changing a normally black-on-white character to a white-on-black character.

RD. Received data.

RLSD. Received line signal detector. Also called CD (carrier detect).

ROS. Read only storage.

RTS. Request to send.

S

screen format. A format that defines the number of rows and columns of the display screen. The 3162 provides four screen formats: 24 (row) x 80 (column), 24 x 132, 28 x 80, and 28 x 132.

scroll. To move vertically a partition in such a manner that new data appears at one edge as old data disappears at the opposite edge of the viewport.

send mark. A mark, defined by an application program or an operator, that specifies the data area to be sent to the host system or the optional device.

setup menu. A menu that is displayed on the screen and is used to define the 3162 setup parameters. Setup menus include GENERAL, COMMUNICATION, KEYBOARD/PRINTER, and FUNCTION menus. See also setup parameter.

setup parameter. A variable that should be defined to customize the 3162 before operating it. See also setup menu.

setup value. See setup parameter.

T

TD. Transmission data.

***terminal.** (1) A point in a system or network at which data can either enter or leave. (2) A device, usually equipped with a keyboard and a display device, capable of sending and receiving information over a link.

test mode. A mode in which the internal circuits are checked and the test pattern is displayed. This mode is started by the *Test* key.

transmission. (1) The sending of data from one place for reception elsewhere. (2) (TC97) The dispatching of a signal, message, or other form of intelligence by wire, radio, telegraphy, telephony, facsimile, or other means.

transparent mode. A mode in which host commands are handled as character strings.

U

unformatted page. A page in which no field has been defined by an application program. Contrast with formatted page.

unprotected field. On a display device, a display field in which the user can enter, modify, or erase data from the keyboard. Contrast with protected field.

V

viewport. A rectangular area on the usable area of the display surface through which the operator views all or portion of the data. The 3162 can have up to three viewports.

VM. Volatile memory.

X

XOFF. Transmitter off.

XON. Transmitter on.

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Special Characters

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IBM 3162 ASCII Display Station
User's Guide
Order No. GA18-2493-0

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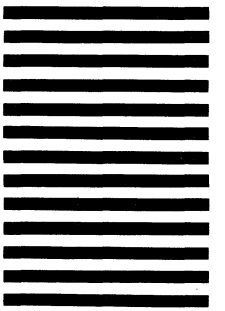

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Exhibit to IBM Statement of Limited Warranty

IBM 3162 ASCII Display Terminal Limited Warranty

IF YOU PURCHASED THE IBM 3162 ASCII DISPLAY STATION (MACHINE) DIRECTLY FROM INTERNATIONAL BUSINESS MACHINES CORPORATION (IBM), OR ANOTHER IBM ORGANIZATION, UNDER AN AGREEMENT FOR PURCHASE OF IBM MACHINES, THE WARRANTY PROVISIONS THEREIN SHALL PREVAIL AND THIS EXHIBIT AND THE ENCLOSED STATEMENT OF LIMITED WARRANTY SHALL NOT APPLY.

WARRANTY SERVICE DESCRIBED IN THE ENCLOSED STATEMENT OF LIMITED WARRANTY IS AVAILABLE ONLY FOR MACHINES PURCHASED AND LOCATED IN THE UNITED STATES OR PUERTO RICO.

IF YOU PURCHASED THIS MACHINE FROM A SUPPLIER AUTHORIZED BY AN IBM ORGANIZATION TO MARKET THIS MACHINE IN OTHER THAN THE UNITED STATES OR PUERTO RICO, WARRANTY INFORMATION IS AVAILABLE FROM SUCH SUPPLIER.

I. **Date of Installation (Warranty Start Date):**
The Date of Installation, which is the start date, will be the day (Monday through Friday) following the date of delivery of the Machine to you from an IBM Authorized Dealer, an IBM Authorized Distributor or a Reseller who purchased the Machine from such Distributor, as applicable. Delivery is deemed to be complete when the Machine is placed in your possession; however, when the Machine is shipped to you, delivery will be deemed to be complete three days after the date of shipment from an IBM Authorized Dealer, an IBM Authorized Distributor or a Reseller who purchased the Machine from such Distributor, as applicable. You are responsible to set up this Machine in accordance with the instructions furnished by IBM.

II. **Warranty Duration:**
3 years

III. **Type of Service:**
Customer Carry-in Exchange (CCE)

IV. **Period of Warranty Service Availability:**

When rendered by IBM, is available during the normal business hours of the applicable IBM Service/Exchange Center. When rendered by an IBM Authorized Dealer or an IBM Authorized Distributor, is available during the hours and days prescribed by such Dealer or Distributor.

V. **Provider of Warranty Service:**

IBM or the IBM Authorized Dealer or IBM Authorized Distributor from whom the Machine was purchased.

There is enclosed the IBM Statement of Limited Warranty.

You may be required to provide a dated proof of purchase of this Machine from the IBM Authorized Dealer, the IBM Authorized Distributor or the Reseller who purchased this Machine from such Distributor and evidence of the date of delivery to you in order to obtain warranty service. If you have any questions regarding warranty service, contact your point of purchase, or call IBM at 1-800-428-2569.

The following Warranty Option is available, for three year warranted machines, for a charge, under the IBM Maintenance Agreement.

IBM On-Site Exchange (IOE)

International Business Machines Corporation

Armonk, New York 10504

Statement of Limited Warranty

DEFINITIONS

The term "Machine" as used herein refers to machines and/or their features, model conversions, machine elements and accessories unless the context requires individual reference.

The terms "Machines" and "machines" are used in substitution for the terms "Products" and "products," respectively. Such latter terms appear in selected IBM agreements.

The term "failing machine" refers to machine or machine element requiring warranty service. The term "exchange machine" refers to a machine or machine element provided by IBM to the Customer under an Exchange Type of Service.

The term "programming" shall mean such programming as IBM may make generally available, without separate charge, for machines of the types ordered by the Customer.

WARRANTIES

Machines purchased from IBM under an agreement for purchase of IBM machines or from an IBM approved Remarketer, or an IBM Authorized Dealer, Distributor or Wholesaler will be 1) newly manufactured by or for IBM from new and serviceable used parts which are equivalent to new in performance in these Machines, 2) assembled by or for IBM from serviceable used parts, or 3) Machines which have been previously installed.

IBM warrants that on the Date of Installation each Machine will be in good working order and will conform to IBM's official published specifications which are available upon request.

The Warranty Period for each Machine commences on its Date of Installation.

Warranty service as described herein may be provided by IBM, an applicable IBM Authorized Dealer, or an IBM selected independent contractor, as indicated in the applicable Exhibit.

IBM will not provide warranty service hereunder for Machines or programming located outside the United States and Puerto Rico.

Service and Parts Warranty

Commencing on the Date of Installation of each machine, model upgrade and feature addition, and continuing for the duration of the Warranty Period, IBM agrees to provide the availability of warranty service at no additional charge except as set forth in this subsection or in the subsection entitled "Travel Expense," to keep the machines, model upgrades and feature additions in, or restore them to, good working order. Warranty service will be provided by repairing the machines, model upgrades or feature additions or exchanging the machines under one of the Types of Service described in the subsection entitled "Types of Service." The specific Type of Service for each machine, model upgrade or feature addition will be indicated in the applicable Exhibit. Warranty options that provide alternate Types of Service are available for certain Machines under an IBM maintenance agreement.

It is the Customer's responsibility to determine when a machine or machine element requires warranty service. Before requesting warranty service, the Customer will perform any problem determination procedures provided by IBM, and if service is required, the Customer will follow the service request procedures provided by IBM.

When the Customer presents a failing machine to IBM under a Repair Type of Service, IBM will provide warranty service to restore the failing machine to good working order. Repair Types of Service include remedial maintenance and may include preventive maintenance based on the specific needs of individual machines as determined by IBM. Repair Types of Service may also include lubrication, adjustments and replacement of parts, all as deemed necessary by IBM. Parts, which may be used parts, will be furnished on an exchange basis, and the replaced parts become the property of IBM. When a failing machine is to be repaired under a Repair Type of Service, the Customer is responsible to remove or implement other safeguards to protect all programming, programs, data and removable storage media before such repair.

When the Customer presents a failing machine to IBM under an Exchange Type of Service, it becomes the property of IBM at the time of exchange. An exchange machine may not be new, but will be in good working order, and becomes the Customer's property at the time of exchange. IBM reserves the right to verify that warranty service for a failing machine is required prior to providing an exchange machine. When a failing machine is exchanged, the Customer will remove all programming, programs, data and removable storage media, and all non-IBM parts, options, alterations and attachments before such exchange. The Customer agrees that all such

items not removed will be deemed to have been discarded by the Customer. The Customer will not present to IBM a failing machine for exchange which is defaced, altered or damaged beyond repair. (Repair is as described in the preceding paragraph.) However, if upon inspection IBM determines it has received in exchange a failing machine in such condition, the exchange will be nullified and each party will return to the other the machine or machine element in its possession.

The Period of Warranty Service Availability for IBM On-Site Repair and IBM On-Site Exchange Types of Service are specified in the applicable Exhibit. Outside such Period, warranty service, if requested by the Customer and provided by IBM, will be subject to charge for travel expense plus travel, waiting and service time at IBM's then applicable hourly service rates and minimum charges: however, there will be no additional charges for parts.

The Period of Warranty Service Availability for Customer On-Site Exchange, Customer Carry-In Exchange and Customer Carry-In Repair Types of Service are specified in the applicable Exhibit.

Warranty service described herein does not assure uninterrupted operation of the Machines. IBM may, at its option, store on the Customer's premises maintenance equipment and/or parts that IBM deems necessary to fulfill this warranty.

During the Warranty Period, engineering changes, determined applicable by IBM, will be controlled by IBM and installed as specified by IBM on the Machines. The Customer may, by providing notice subject to written confirmation by IBM, elect to have only mandatory changes, as determined by IBM, installed on Machines so designated.

IBM shall have full, free and safe access to the Machines to provide IBM On-Site Types of Service thereon. The Customer shall promptly inform IBM of any change in a Machine's location during the Warranty Period.

In respect to warranty service provided by IBM, the Customer is responsible for all risk of loss of, or damage to, Machines owned by other than IBM during the period such Machines are in transit to and from IBM, except for loss or damage caused by IBM's negligence. However, IBM is responsible for risk of loss of, or damage to, Machines owned by other than IBM while in possession of IBM or in transit from IBM by an IBM selected carrier whose expenses were prepaid by IBM.

The Customer represents and warrants that, at the time a failing machine becomes IBM's property, it will be free of any outstanding liens, security interests or other encumbrances held by any third party.

If the Warranty Period expires on a Friday or Saturday, it will be extended so that the last day of such Warranty Period will be on the following Sunday.

Types of Service

IBM On-Site Repair (IOR)

IBM will provide warranty service for the failing machine at the Customer's location.

IBM On-Site Exchange (IOE)

IBM will 1) deliver the exchange machine to the Customer's location, 2) disconnect the failing machine, 3) connect the exchange machine, 4) verify its operation, and 5) remove the failing machine from the Customer's location.

Customer On-Site Exchange (COE)

IBM will have an exchange machine delivered to the Customer's location. The Customer will 1) disconnect the failing machine and prepare it for shipment to IBM, 2) connect the exchange machine, and 3) verify its operation. The Customer will follow IBM's instructions regarding the shipment of the failing machine to IBM. Such shipment will be at IBM's expense.

Customer Carry-In Exchange (CCE)

The Customer will 1) deliver the failing machine to an IBM Service/Exchange Center or other IBM designated location, 2) pick up the exchange machine and take it to the Customer's location, 3) connect it, and 4) verify its operation.

The Customer, in lieu of such delivery and pick up, may ship the failing machine prepaid, in the original shipping container or equivalent, to one of the designated IBM Service/Exchange Centers designated for this delivery method. IBM will then ship the exchange machine to the Customer's locations, prepaid, within the United States and Puerto Rico.

Customer Carry-In Repair (CCR)

The Customer will 1) deliver the failing machine to an IBM Service/Exchange Center or other IBM designated location, 2) when the failing machine is repaired, pick it up and return it to the Customer's location, 3) connect it, and 4) verify its operation.

The Customer, in lieu of such delivery and pick up, may ship the failing machine prepaid, in the original shipping container or equivalent, to one of the IBM Service/Exchange Centers designated for this delivery method. IBM will ship the repaired machine to the Customer's location, prepaid, within the United States and Puerto Rico.

Programming

IBM warrants that, when shipped to the Customer, programming designated by IBM for use with a Machine and for which programming services are available will conform to IBM's official published specifications which are available upon request.

IBM does not warrant that functions contained in programming will operate in the combinations which may be selected for use by the Customer or will meet the Customer's requirements.

ALL OTHER PROGRAMMING IS DISTRIBUTED ON AN "AS IS" BASIS.

Additional Provisions for Features and Model Conversions

IBM's warranty for each feature addition or model upgrade requires that the machine on which it is installed is at the then current engineering-change level, is the specific serial-numbered machine for which it was ordered and has been modified only with changes obtained from IBM specifically for that serial-numbered machine. If these conditions are not met, IBM will attempt to install non-Customer set-up feature additions and model upgrades on the machine, and, if such attempt results in an incorrectly functioning machine, upon Customer request and at IBM's then applicable hourly service rates and minimum charges, parts and material prices and travel expense, IBM will remove the features and/or model upgrades and restore the machine to its prior condition. If such features or model upgrades did not involve the removal of parts which became the property of IBM, such features and model upgrades remain the property of the Customer. If such features and model upgrades did involve the removal of parts which became the property of IBM, such features and model upgrades become the property of IBM and the restored parts become the property of the Customer.

For a feature removal, model downgrade or reinstallation of a previously purchased feature or model conversion, a three-month parts warranty will apply to additional parts, if any, supplied by IBM.

Additional Provisions for Accessories

Accessories have a three-month Warranty Period unless otherwise specified by IBM. During the Warranty Period, the Customer will remove any defective or failing accessory and ship it prepaid to the designated IBM location. IBM will replace such accessory and ship the replacement to the Customer without charge.

Additional Provisions for Machines Containing Funds

The Customer is responsible for removing, controlling and replacing or reloading funds contained in the Machines. IBM will service Machines containing funds only when the cash container cannot be opened prior to repair by IBM, in which case the Customer will remove the funds as soon as the container has been opened.

Services for Additional Charge During the Warranty Period

The services for additional charge described in this subsection are not warranty services. However, unless such services are provided under another written agreement between the Customer and IBM, during the Warranty Period, the following services, if available, will be provided by IBM to the Customer at IBM's i) then generally available hourly service rates and minimum charges for IBM service time, including travel and waiting time, ii) parts and material prices then generally in effect, and iii) charges for travel and shipping expense, all as applicable;

1) Repair of Machine damage, replacement of parts or increase in service time caused by --
   a) failure to continually provide a suitable environment prescribed by IBM including adequate space, electrical power, air conditioning and humidity control:
   b) neglect; misuse, including use of the Machines for purposes other than for which designed:
   c) accident; disaster, including water, wind and lightning, transportation; vandalism or burglary:
   d) alterations, including any deviation from IBM's Machine design:
   e) attachments, including any interconnection to the Machine of non-IBM equipment or devices not under an IBM maintenance agreement:
   f) IBM Machines, other Machines or accessories, except those IBM Machines, other Machines or accessories that are owned by IBM, under warranty from IBM or under an IBM maintenance agreement:
   g) conversions from one IBM model to another or installation or removal of an IBM feature whenever any of these activities was performed by other than IBM, except that this item (g) will apply only during the first three-month period subsequent to such Machine modification: and
   h) maintenance or repair of the Machine not performed by IBM.
2) Repair of Machine damage, replacement of maintenance parts (due to other than normal wear) or repetitive service calls caused by the use of, inadequate use of, or failure to use, supplies:
3) Service for accessories other than as provided in the subsection entitled "Additional Provisions for Accessories" of this Section:
4) Inspection of altered Machine:
5) Replacement or addition of parts and increase in service time associated with the installation by IBM of an engineering change, required due to the conversion of one IBM model to another or installation or removal of an IBM feature whenever any of these activities was performed by other than IBM:

6) Rearrangement or relocation of Machines and provision of necessary materials: and
7) Replacement of a part not furnished for the Machine by IBM with a directly interchangeable IBM maintenance part, and any increase in service time associated with such activity, except that IBM will not replace any part which is included in an alteration.

Travel Expense

There will be no charge for travel expense associated with warranty service or programming service during the applicable Period of Warranty Service Availability except that actual travel expense will be charged when the site at which the Machine is located is normally inaccessible by both private automobile and scheduled public transportation.

Exclusions

The warranties stated herein do not include 1) furnishing supplies, painting or refinishing the Machines or furnishing material therefor, 2) electrical work external to the Machines, 3) installation, maintenance or removal of alterations or attachments to the Machines, and 4) any service which is impractical for IBM to render because of alterations in, or attachments to the Machines. IBM does not warrant that the operation of Machines or programming will be uninterrupted or error free or that all programming errors will be corrected.

THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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