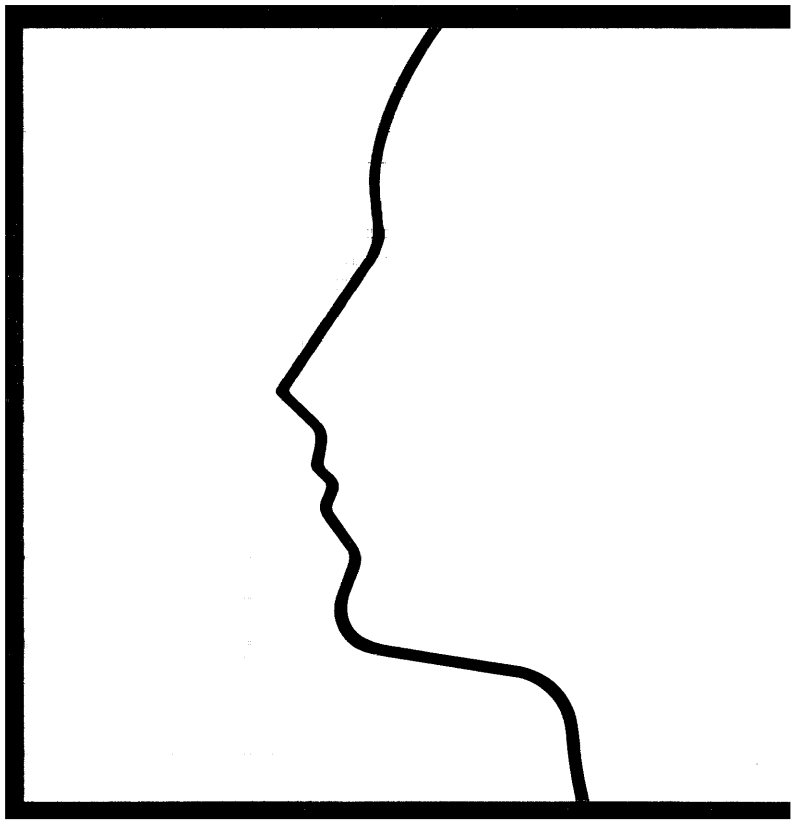
TEXAS INSTRUMENTS

# EXPLORER™

## DISPLAY UNIT

## GENERAL DESCRIPTION



# EXPLORER™ DISPLAY UNIT GENERAL DESCRIPTION

# LIST OF EFFECTIVE PAGES

**Note:** The changes in the text are indicated by a change number at the bottom of the page and a vertical bar in the outer margin of the changed page. A change number at the bottom of the page but no change bar indicates either a deletion or a page layout change.

Explorer™ Display Unit General Description (2243151-0001 *A)

Original Issue ..... May 1985
Change 1 ..... June 1986



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| | |
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# ABOUT THIS MANUAL

## Purpose

This manual describes general information and installation procedures for the Texas Instruments Explorer Display Unit. The information in this manual is intended for system designers, value added retailers (VARs), maintenance personnel, system users, and operators.

## Contents of This Manual

This information is divided into the following four sections:

**Section 1:** Introduction — Briefly describes the features and specifications necessary to acquaint the reader with the system.

**Section 2:** Installation — Provides requirements for site installation, electrical requirements, and component connections.

**Section 3:** Operation — Describes the component controls and indicators of the display unit and their operation. This section also provides adjustments and preventive maintenance.

**Section 4:** System Design — Provides a general overview of the system design.

# CONTENTS

| | Table | Title | Page |
|---|---|---|---|

**Tables**

# INTRODUCTION 1

**Highlights of This Section**

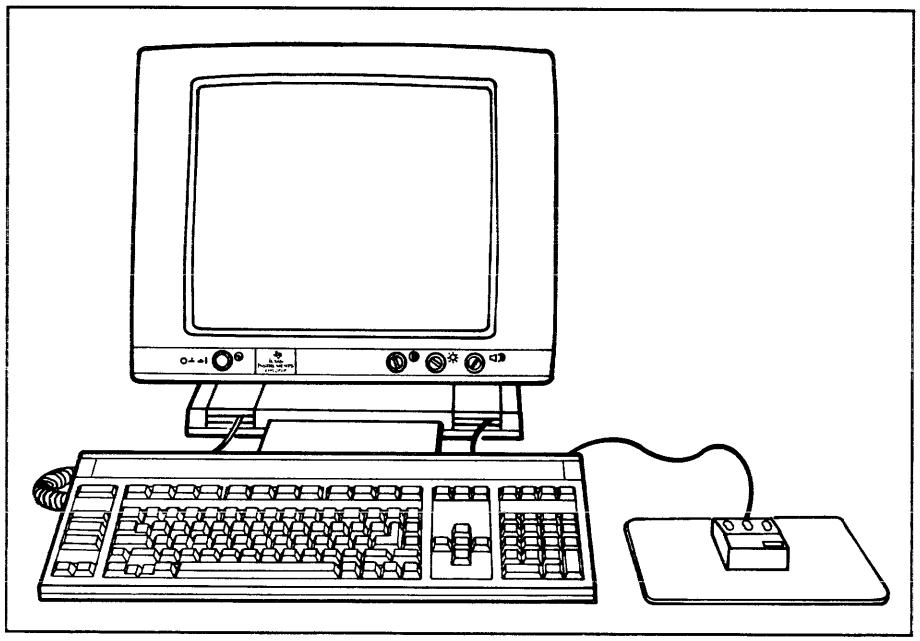
This section provides a general overview, the specifications and environmental requirements, and a description for the display unit:

- Display monitor
- Keyboard
- Mouse

## General

**1.1** The Explorer display unit, sometimes called the console, (Figure 1-1) consists of a display monitor assembly, a keyboard and a mouse with an optical pad. The display unit, along with a system enclosure and a mass storage enclosure, comprises an operating system. The display monitor provides a high-resolution, bit-mapped video display for viewing your inputs and system activities. The mouse and keyboard allow fast interaction with the system. The connection to the system enclosure from the display monitor is by a fiber-optic cable. This lightweight and flexible cable provides a data transfer rate of 68 megabits per second. The fiber-optic cable connects to a fiber-optic driver/receiver located on the backplane of the system enclosure. The light impulses from the monitor are converted into electrical signals at the fiber-optic board, which are then sent to the system interface board (SIB).

**Figure 1-1** **Explorer Display Unit**



## Display Monitor Assembly

**1.2** The display monitor assembly contains cable connections for the keyboard and mouse, as well as connections for a microphone and headset that can be used for future speech operations. The display monitor provides audio output via a speaker located inside the display monitor cover. The video display has the capability to display both normal and inverse video images. The display monitor uses a noninterlaced raster at a 60-hertz refresh rate to minimize flicker.

The display monitor can be adjusted for both height and tilt. These adjustments range from 104.22 millimeter (4.3 inches) maximum for the height and 5 degrees forward to 20 degrees backward for the tilt. All operator controls are located on the front of the display monitor for operator convenience. Refer to Section 3 for instructions on height and tilt adjustments.

The display monitor also has the capability of a 360-degree swivel. Although a 360-degree swivel is possible, the fiber-optic and power cables, and the keyboard and mouse cables may restrict this movement.

**CAUTION: Making excessive swivel adjustments when the cables are attached can damage the cables or connections.**

## Keyboard

**1.3** The low-profile keyboard contains 112 keys, which include standard QWERTY keys, Lisp-specific keys, duplicate mouse keys, cursor control keys, and a numeric pad. The keys (F and J) are indented. This assists in positioning the fingers to the home key without visual reference. The keyboard provides snap-action tactile feedback, a buffer to store keystrokes, and special combinations of keys to invoke specific operations. Software programmable features include the following:

- Key-click option to provide audio feedback
- Electronic locks for modifier keys with a light-emitting diode (LED) on the keytop to indicate whether the lock feature is on
- Automatic repeat function

The keyboard has the capability of performing a self-test, that completely tests the keyboard RAM and ROM upon receiving code 00 from the system enclosure.

## Mouse

**1.4** The mouse is a palm-sized device that, when moved over the optical pad, moves the mouse cursor on the monitor. The mouse allows rapid selection of items that are displayed on the video display. The three key switches on the mouse allow single-handed inputs on selected items. When used with software that takes advantage of the mouse's capabilities, the mouse offers fast, efficient operation.

## Specifications and Environmental Requirements

**1.5** The following paragraphs and tables list the specifications and environmental requirements for the display monitor assembly, the keyboard, and the mouse.

### Display Monitor Assembly

**1.5.1** Table 1-1 lists the specifications for the display monitor assembly.

**Table 1-1 Display Monitor Assembly Specifications**

| *Item* | *Specification* |
|---|---|
| Vertical synchronization | 57 to 63 Hz adjustable |
| Horizontal synchronization | 775 to 825 active lines at 60 Hz |
| Phosphor | 16 ms at 10% of initial brightness |
| Video input: | |
| Low (beam off) | 0.0 to 0.8 V |
| High (beam on) | 2.5 to 5.5 V |
| Audio frequency range | 76 Hz to 16 kHz, 3 voices plus noise |
| Display | 431.8-cm (17-in) landscape design, 1024 by 808 pixels |
| Power input requirements (input voltage range): | |
| Low | 90 to 132 Vac, 3-wire service (line, neutral, and ground) |
| High | 180 to 264 Vac, 3-wire service (line, neutral, and ground) |
| Input frequency | 47 to 63 Hz |

Table 1-2 lists the environmental requirements for the display monitor assembly.

**Table 1-2 Display Monitor Assembly Environmental Requirements**

| *Item* | *Operating* | *Nonoperating* |
|---|---|---|
| Ambient temperature | 0 to 35 degrees C<br>(32 to 95 degrees F) | −40 to 65 degrees C<br>(−40 to 149 degrees F) |
| Vibration | 0.5 g at 5 to 250 Hz | 0.5 g at 5 to 250 Hz |
| Shock | 15 g maximum<br>(½ sine wave) | 25 g maximum<br>(½ sine wave) |
| Relative humidity | 15 to 80%<br>(noncondensing) | 5 to 95%<br>(noncondensing) |
| Altitude | −300 to 2000 m<br>(−1000 to 6000 ft) | −300 to 3000 m<br>(−1000 to 10 000 ft) |
| Maximum humidity change | 10% per hour | 10% per hour |
| Wet bulb restrictions | 26 degrees C<br>(78.8 degrees F) | 30 degrees C<br>(86 degrees F) |

**Table 1-3 Keyboard Environmental Requirements**

| *Item* | *Operating* | *Nonoperating* |
|---|---|---|
| Ambient temperature | 5 to 35 degrees C<br>(41 to 95 degrees F) | −30 to 70 degrees C<br>(−22 to 158 degrees F) |
| Vibration | 2.0 g (5 to 500 Hz) | 4.0 g |
| Shock | 2.0 g (½ sine wave) | 140 g (½ sine wave) |
| Relative humidity | 10 to 80%<br>(noncondensing) | 5 to 95%<br>(noncondensing) |
| Altitude | 0 to 3048 m<br>(0 to 10 000 ft) | 0 to 13 716 m<br>(0 to 45 000 ft) |

**Mouse** **1.5.3** Table 1-4 lists the environmental requirements for the mouse.

**Table 1-4** **Mouse Environmental Requirements**

| *Item* | *Operating* | *Nonoperating* |
|---|---|---|
| Ambient temperature | 10 to 35 degrees C (50 to 95 degrees F) | −40 to 65 degrees C (−40 to 149 degrees F) |
| Vibration | 0.5 g at 5 to 250 Hz | 0.5 g at 5 to 250 Hz |
| Shock | 20 g (½ sine wave) | 220 g for 2 ms |
| Relative humidity | 15 to 80% (noncondensing) | 5 to 95% (noncondensing) |
| Altitude | −300 to 2000 m (−1000 to 6500 ft) | −300 to 3000 m (−1000 to 10 000 ft) |
| Maximum humidity change | 10% per hour | 10% per hour |

## Physical Description

**1.6** Table 1-5 and the following paragraphs present an overview of the physical descriptions of the display monitor assembly, the keyboard, and the mouse.

**Table 1-5** **Display Unit Dimensions**

| *Measurements* | *Display Monitor* | *Keyboard* | *Mouse* |
|---|---|---|---|
| Width | 439.4 mm (17.3 in) | 520 mm (20.3 in) | 68.5 mm (2.7 in) |
| Height: | | | |
| Minimum | 431.8 mm (17.0 in) | 35.56 mm (1.4 in) | 30.5 mm (1.2 in) |
| Maximum | 538 mm (21.2 in) | 76.2 mm (3.0 in) | |
| Depth | 411.5 mm (16.2 in) | 203 mm (8.0 in) | 101.6 mm (4.0 in) |
| Weight | 15.8 kg (35.0 lb) | 2.72 kg (6.0 lb) | 155 g (5.5 oz) |
| Weight (with anti-glare screen) | 17.9 kg* (39.5 lb) | 2.72 kg (6.0 lb) | 155 g 5.5 oz) |

**NOTE:**
* 15.8 kg (35.0 lb) without anti-glare screen

### Display Monitor Assembly

**1.6.1** The display monitor assembly (Figure 1-2) consists of the base and monitor. The monitor consists of a metal chassis that contains the video display, the power supply, the monitor interface board, and the phase-locked loop board. A plastic cover is mounted over the metal chassis to enclose the components. The connectors for the power cord and fiber-optic cable are located on the back of the monitor. The monitor mounts on the base. The base contains two gas cylinders that are used for the height and tilt adjustments, and the connectors for the keyboard, mouse, headset, and microphone.

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**WARNING: Lethal voltage exists inside of the display monitor. Do not attempt to remove the cover. All display monitor service must be performed by qualified service personnel.**

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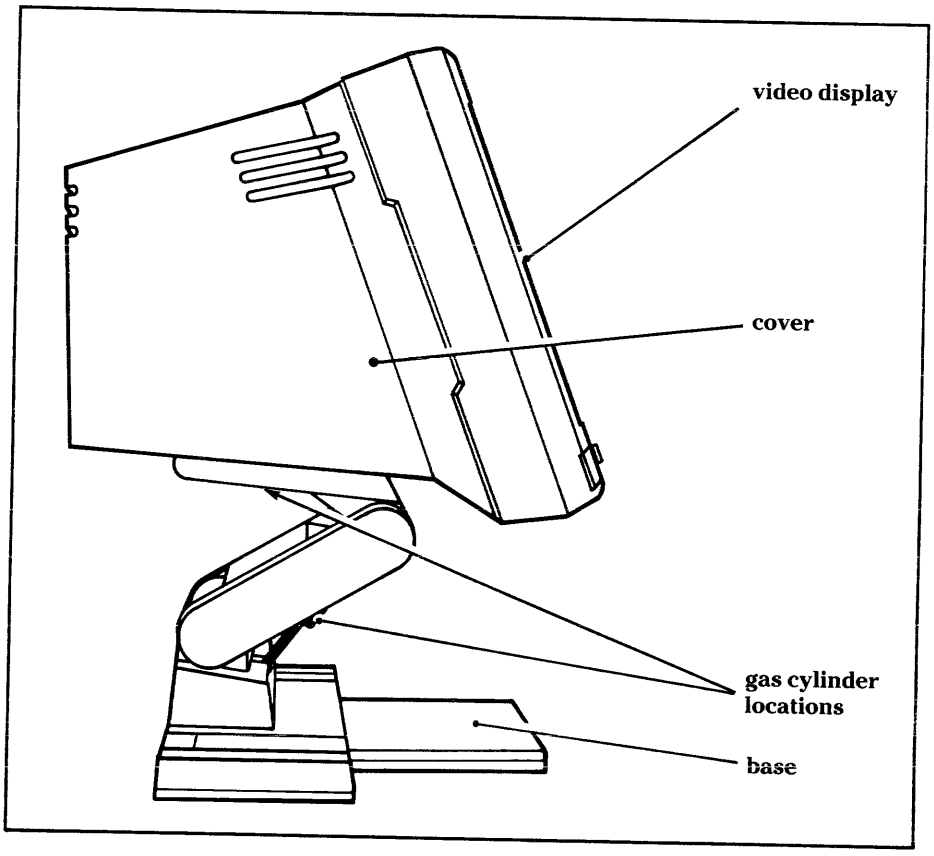
The video display is a 431.8-centimeter (17-inch) diagonal tube with a high-resolution, anti-glare display of 1024 pixels horizontally and 808 pixels vertically. The video display is monochrome with simulated tones of gray supported by the software.

**Figure 1-2** **Display Monitor Assembly**




**Keyboard Assembly**

**1.6.2** Table 1-5 lists the dimensions of the keyboard. The keyboard (Figure 1-3) consists of a base, a cover, a tilt adjustment foot, a cable, and a printed circuit board with components. The keyboard cable plugs into the display monitor base assembly. The keyboard (Figure 1-4) consists of 112 keys that perform various operations. Refer to the *Explorer Operations Guide* for the specific uses of each key. The keyboard consists of the following groups of keys:

- Character keys — Similar to standard typewriter keys; used for data entry.
- Cursor positioning keys — Move the keyboard cursor within a line or to another line.
- Program control keys — Exit and resume programs.
- Information and status keys — Supply information, invoke utilities, and control the keyboard.
- Modifier keys — Used simultaneously with other keys.

- Mode keys — Electronically lock capital letters, bold, mode, and italics.
- User interaction keys — Modify information displayed on the monitor or used to exit certain programs.
- Mouse keys — Function the same as corresponding key switches on the mouse.
- Cursor pad keys — Control the direction of the keyboard cursor.
- Number pad keys — Similiar to numeric keys on main part of keyboard; used for convenience when entering only numbers.
- Function keys — Perform functions as programmed in the software.

**Figure 1-3** **Keyboard Assembly**

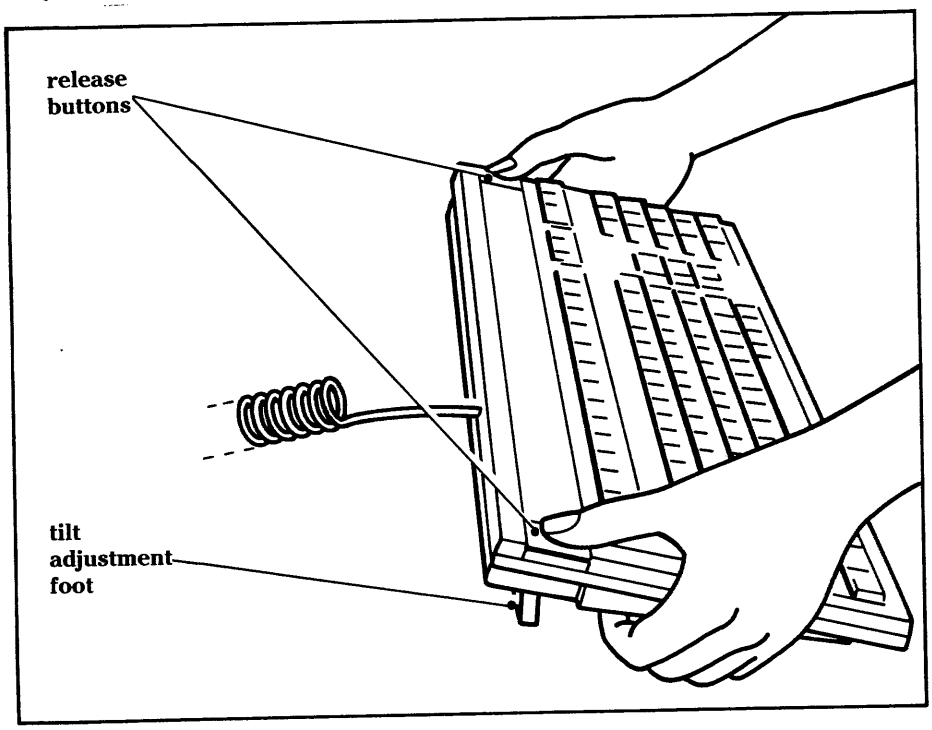
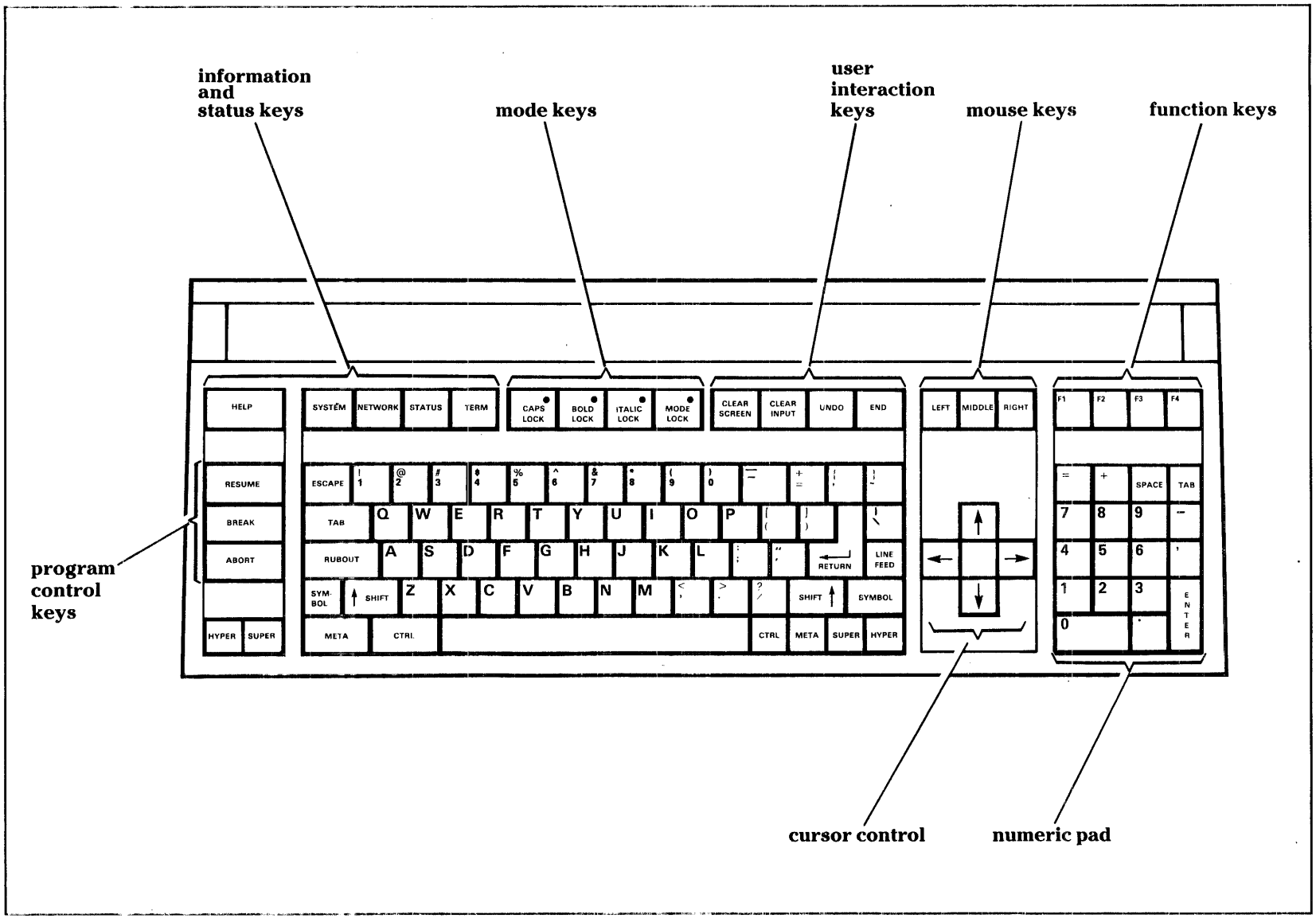


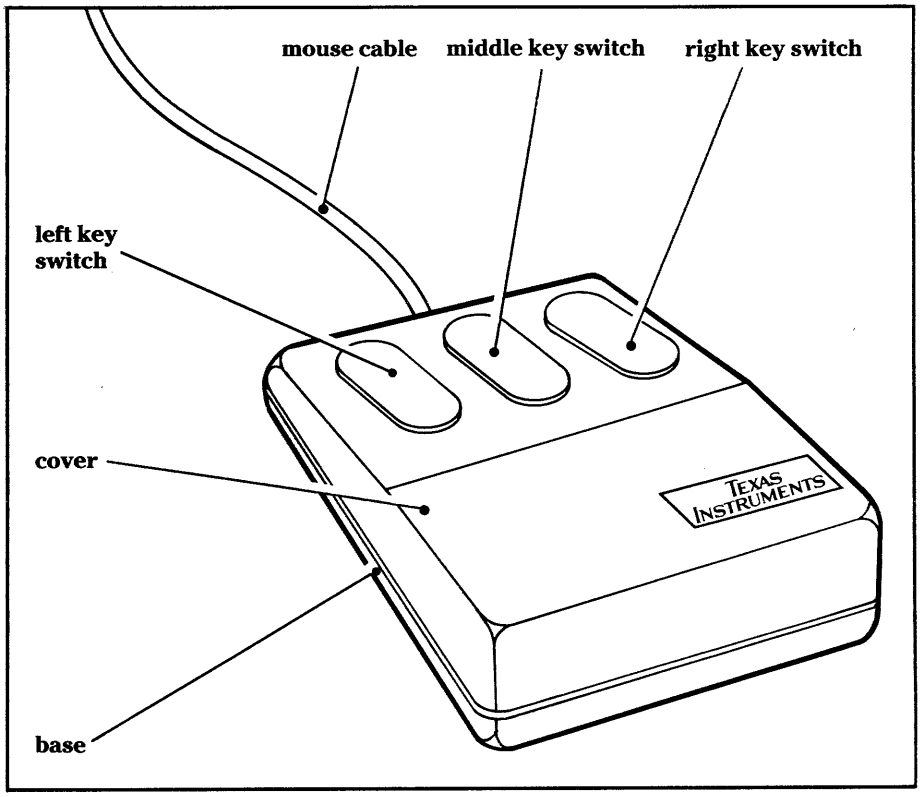
**Figure 1-4 Keyboard Layout**



**Mouse** **1.6.3** Refer to Table 1-5 for the physical dimensions of the mouse. The mouse has a 200 dot-per-inch resolution with a quadrature data output format. The mouse is not compatible with an RS-232C port. The mouse (Figure 1-5) consists of a base, a cover, three key switches, the mouse cable, (sometimes referred to as a mouse tail), and a printed circuit board. The mouse cable is a nine-conductor cable with a shield.

The optical pad has a gridded mirror-finish surface. The optical pad can measure up to 25.27 centimeters (9.25 inches) wide by 28.57 centimeters (11.25 inches) long and .95 centimeters (0.375 inches) high.

**Figure 1-5 Mouse**



# INSTALLATION 2

**Highlights of This Section**

This section provides information on the installation of the display unit:

- Site electrical requirements
- Site environmental requirements
- Mounting and cooling requirements
- Cable routing, restriction, and connections
- Display unit connections
  - Keyboard connection
  - Mouse connection

## Site Installation

**2.1** Because the keyboard is separate from the display monitor, several configurations can be used to suit the needs of the operating site. The fiber-optic cord comes in different lengths so that the distance from the system enclosure to the display monitor can vary. The work surface used must be adequate to support and contain the display unit. Refer to the *Explorer 7-Slot System Installation* manual for more details on the system and display unit installation.

### Electrical Requirements

**2.1.1** A voltage select switch is located inside the display monitor. The low-voltage position of the select switch sets the display monitor to operate on any ac voltage ranging from 90 to 132 volts at 47 to 63 hertz. The high-voltage position of the select switch is for ac voltage ranging from 180 to 264 volts at 47 to 63 hertz. The display monitor comes with the voltage set for your requirements.

**WARNING: Lethal voltage exists in the display monitor. Do not remove the cover. Service of the display monitor and the voltage setting is to be done only by qualified service personnel.**

The display monitor is designed to accept a CEE(7)V plug regardless of the range selected. A three-wire line cord with separate line, neutral, and ground conductors connects between the display monitor connector and the wall socket or the auxiliary receptacle on the system enclosure.

The display unit comes with two types of power cords. Figure 2-1 shows the power cord that plugs into the auxiliary receptacle on the system enclosure and the prewired cord sets that plug into wall receptacles for the U.S. and other countries. Details of the wall receptacle line plug and system enclosure plug are shown at the left side of the figure. The NEMA 5-15P line plug is supplied in the U.S., Canada, and Japan.

Great Britain has a 240-volt power system, and the line cord has a BS 1363A plug (Figure 2-2) that contains an internal 5-ampere BS 1362 fuse. The fuse can be replaced by inserting a small common screwdriver into the pry slot at either end of the fuse cover and prying upward. The fuse and fuse cover will come out as a single unit.

## Figure 2-1 Power Cords and Connectors

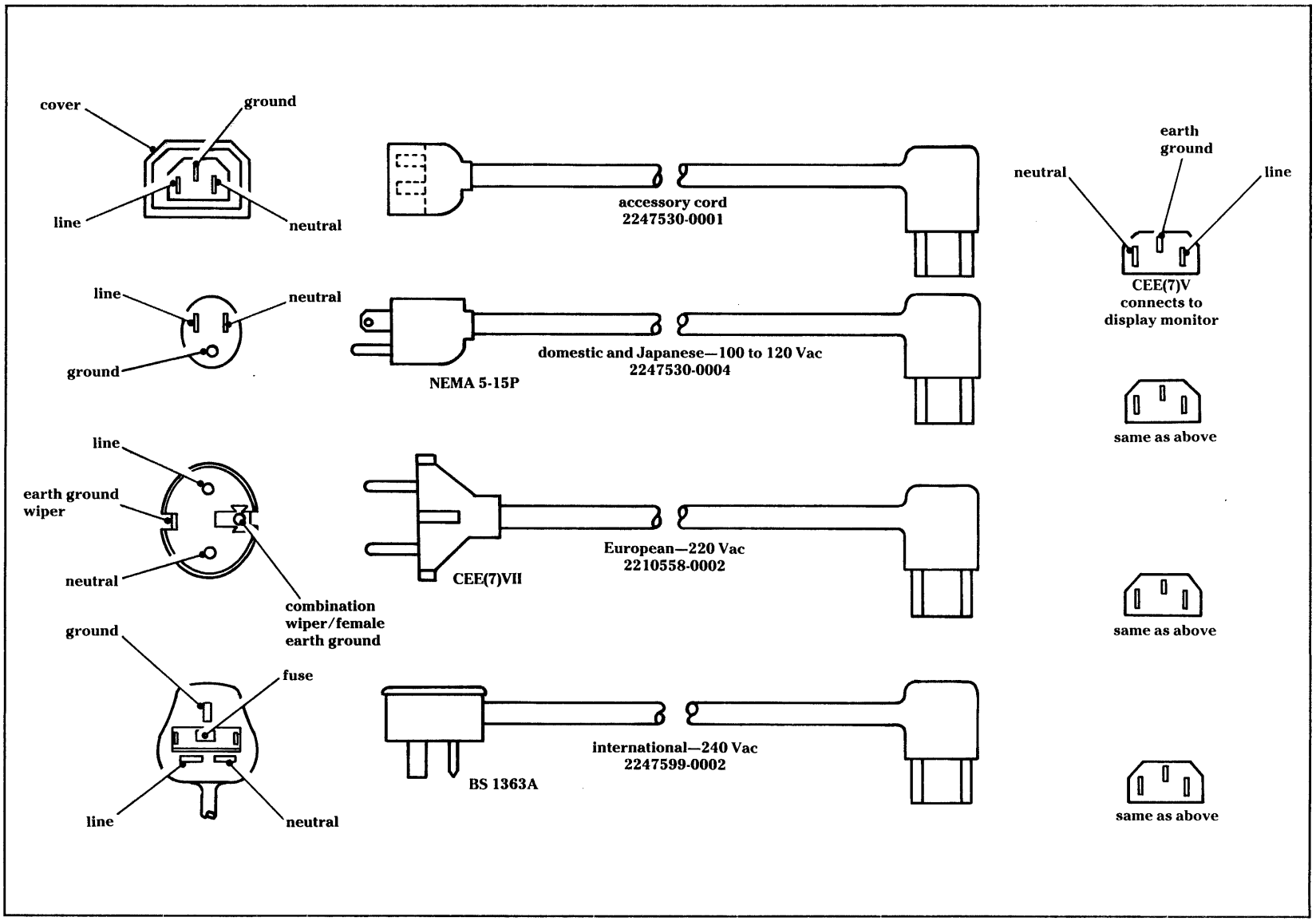
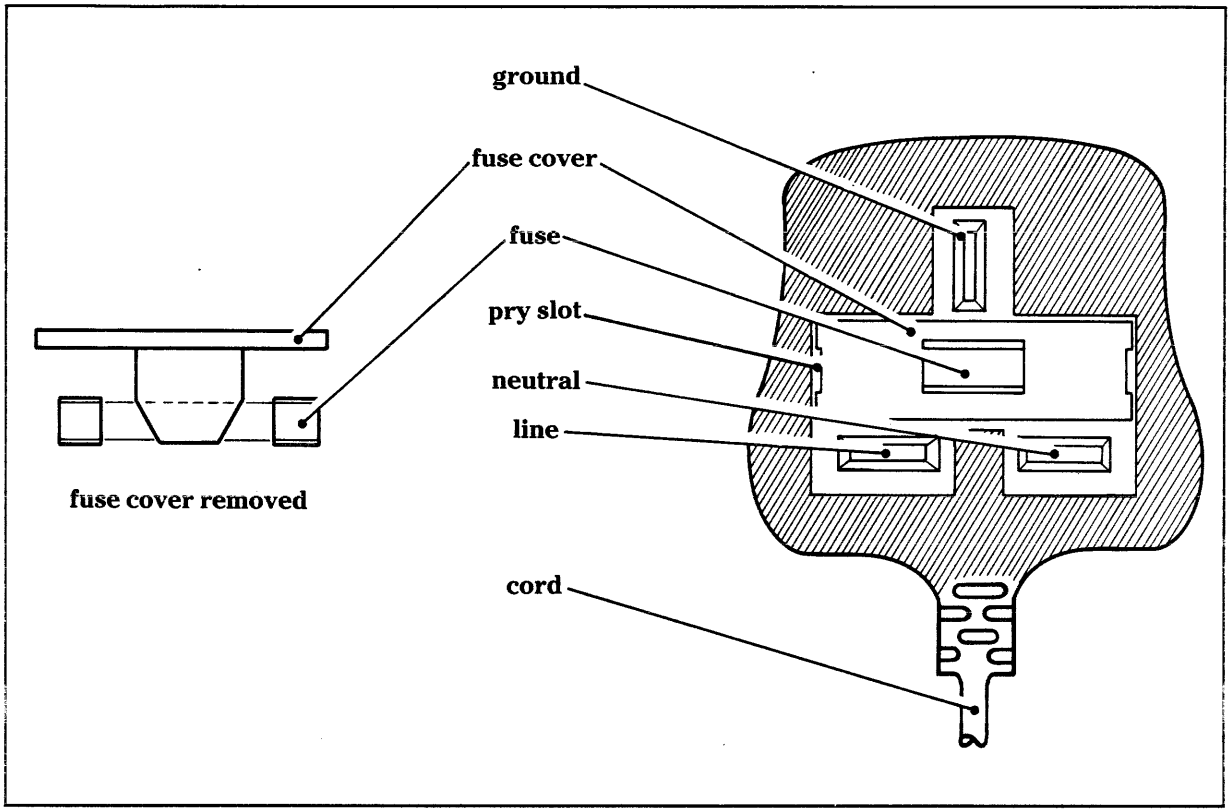


**Figure 2-2 BS 1363A Fused Power Connector for Great Britain**



**Environmental Requirements**

**2.1.2** The display unit can operate in a wide range of operating temperatures and humidities. These ranges coincide with the comfort ranges of most office air-conditioning systems. Refer to Section 1 for a complete listing of operating and nonoperating ranges for the display unit.

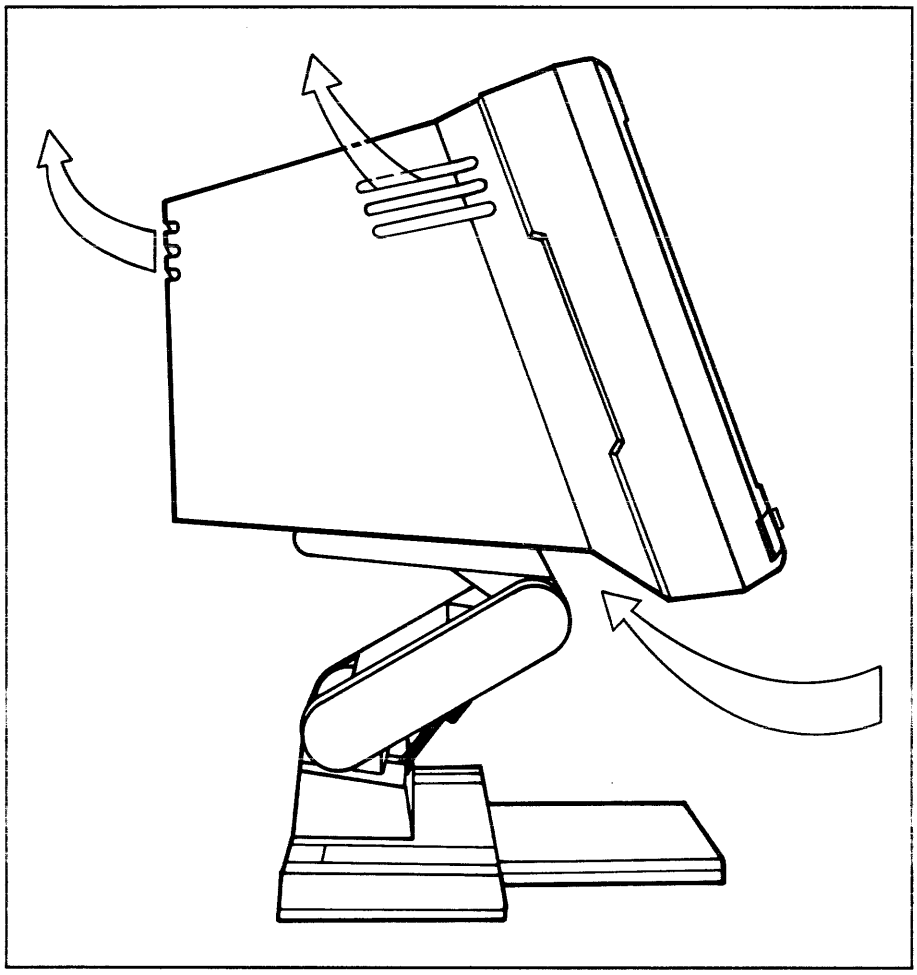
**Mounting Surface**

**2.1.3** The display unit requires adequate space on a flat, horizontal surface. The space must allow room at the rear of the display monitor for the power cord connection. Clearance at the front of the display unit must be adequate for operator viewing, and keyboard and mouse operation. Consideration of the operator's normal position when using the display unit (sitting or standing) determines the height of the mounting surface. Refer to Section 1 for component dimensions for determining workstation requirements.

**Cooling**

**2.1.4** The display monitor uses convection type cooling. Air is drawn in through the bottom of the display monitor and exits through the side and rear vents (refer to Figure 2-3). A small fan is located inside to assist in the convection cooling process.

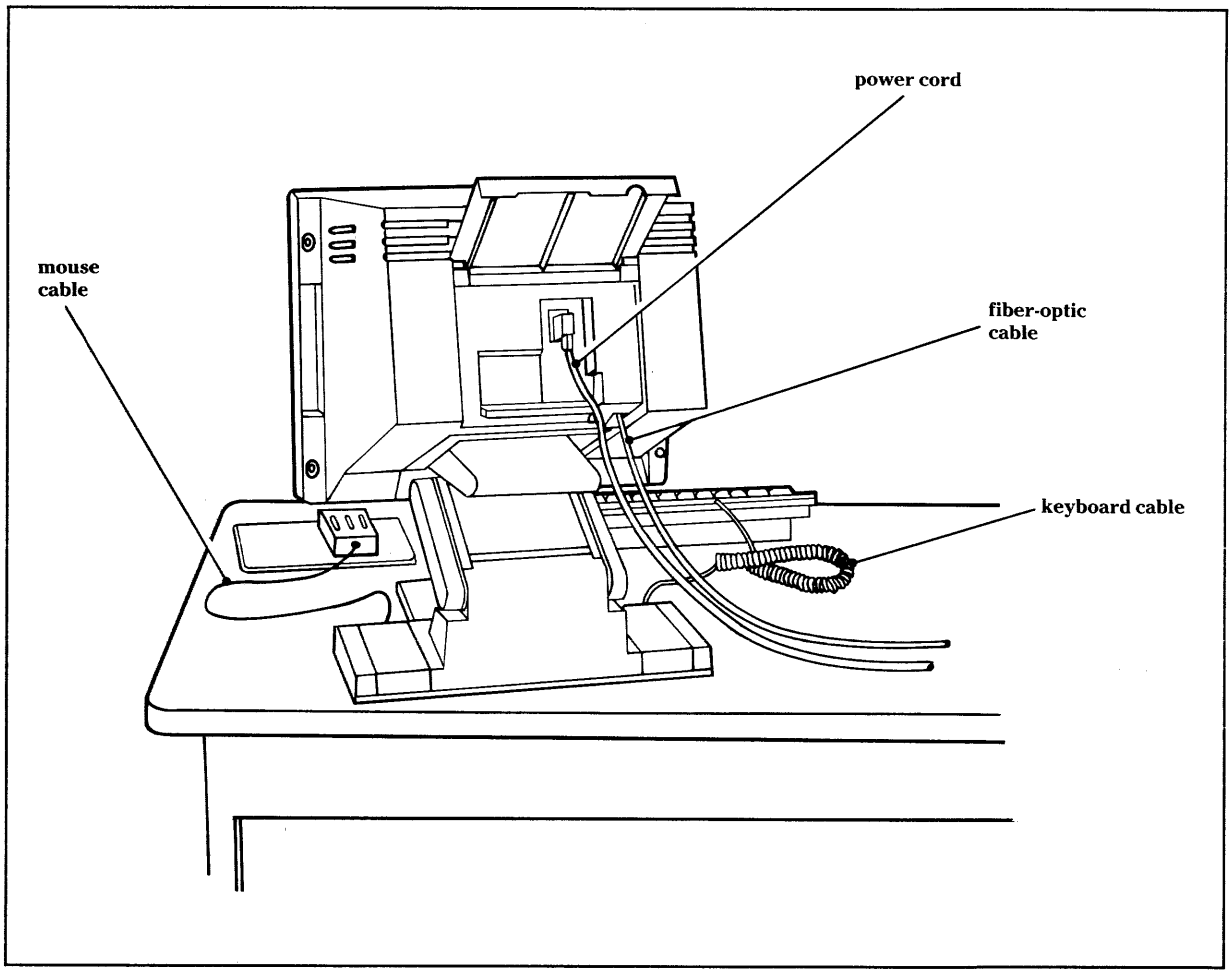
**Figure 2-3** **Airflow**



## Cable Routing

**2.2** Figure 2-4 shows the cable routing and layout for the display unit. The fiber-optic cable is routed from the display unit to the fiber-optic driver/receiver located in the system enclosure. The power cable can be routed to the auxiliary receptacle on the system enclosure or to a wall receptacle. The cables from the keyboard and the mouse are routed to the connectors in the display monitor base.

**Figure 2-4 Cable Routing**



**Cable Restrictions**

**2.2.1** The fiber-optic cable must be routed from the display monitor to the system enclosure. Observe the following rules when routing the fiber-optic cable:

1. Do not route the cable through wet or damp areas.
2. Do not route the cable across traffic areas unless the cable is protected.
3. Do not put a bend in the cable with a radius less than 25 millimeters (1 inch).
4. Use the plenum-duty, approved fiber-optic cable when you need to route the cable within plenum space, such as building ventilation ducts. This is a safety measure required by the National Electrical Code.

**Computer Connection**

**2.2.2** The fiber-optic cable connects to the top connector on the fiber-optic driver/receiver board located on the backplane of the system enclosure. This board is located in the connector that connects to the system interface board. The fiber-optic cable can either be routed through the spring-loaded access door located on the top of the system enclosure or through the opening at the bottom of the rear door. If the power cord from the display monitor will be connected to the auxiliary receptacles on the system enclosure, the same access can be used. Refer to *Explorer 7-Slot Enclosure General Description* manual for more information on cable routing, cable connections, and board locations.

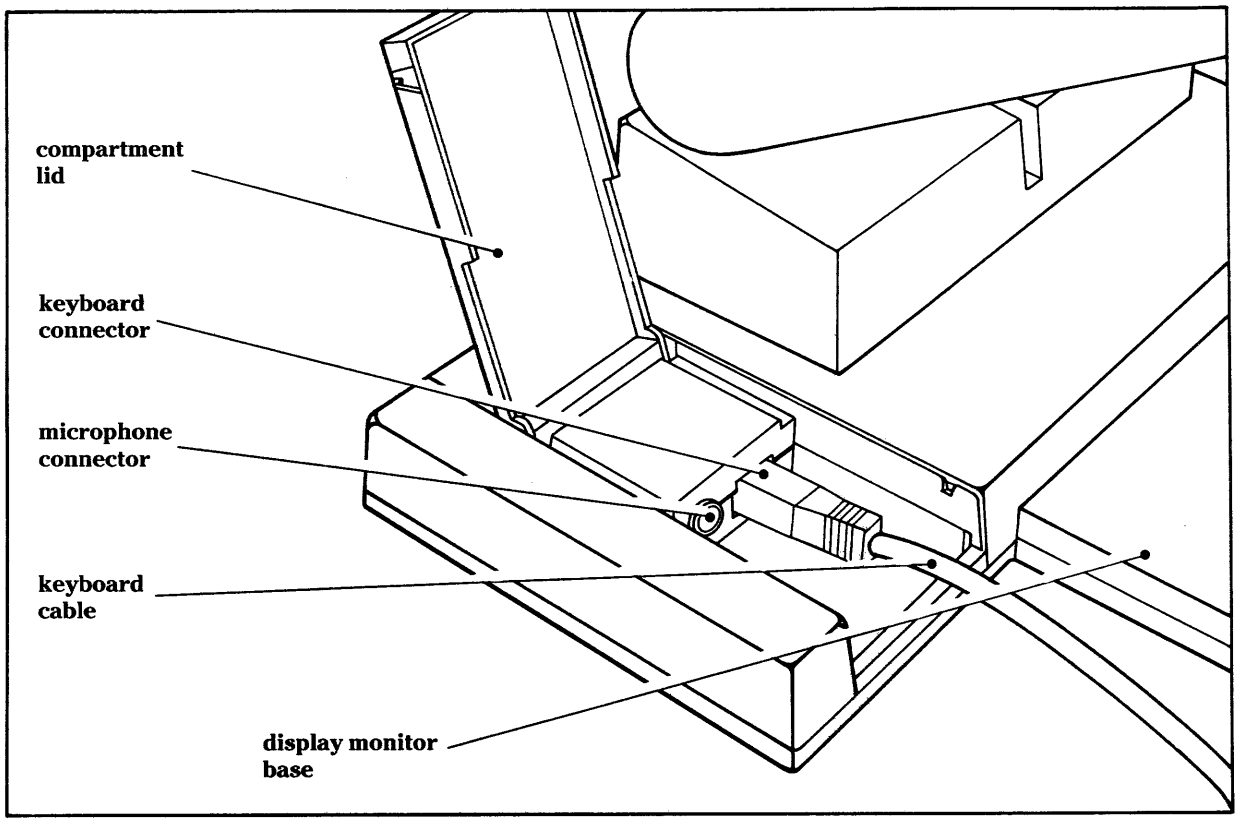
## Display Unit Installation

**2.3** The installation of the display unit consists of attaching the keyboard and the mouse cables to the connectors in the display monitor base assembly. Ensure power is off to the display monitor prior to connecting the keyboard and mouse cables to the base connectors. Refer to Section 3 for the procedure to remove power.

**Keyboard Connection**

**2.3.1** The keyboard cable is connected to the connector (Figure 2-5) located on the left side of the display monitor base assembly. The connector is located under the compartment lid. Lift the lid up by the front edge to access the keyboard connector. The keyboard cable connects to the square connector and will only go in one way. The other connector in the compartment is for a handheld microphone for future speech operations. The compartment lid should be closed after the cable has been connected.

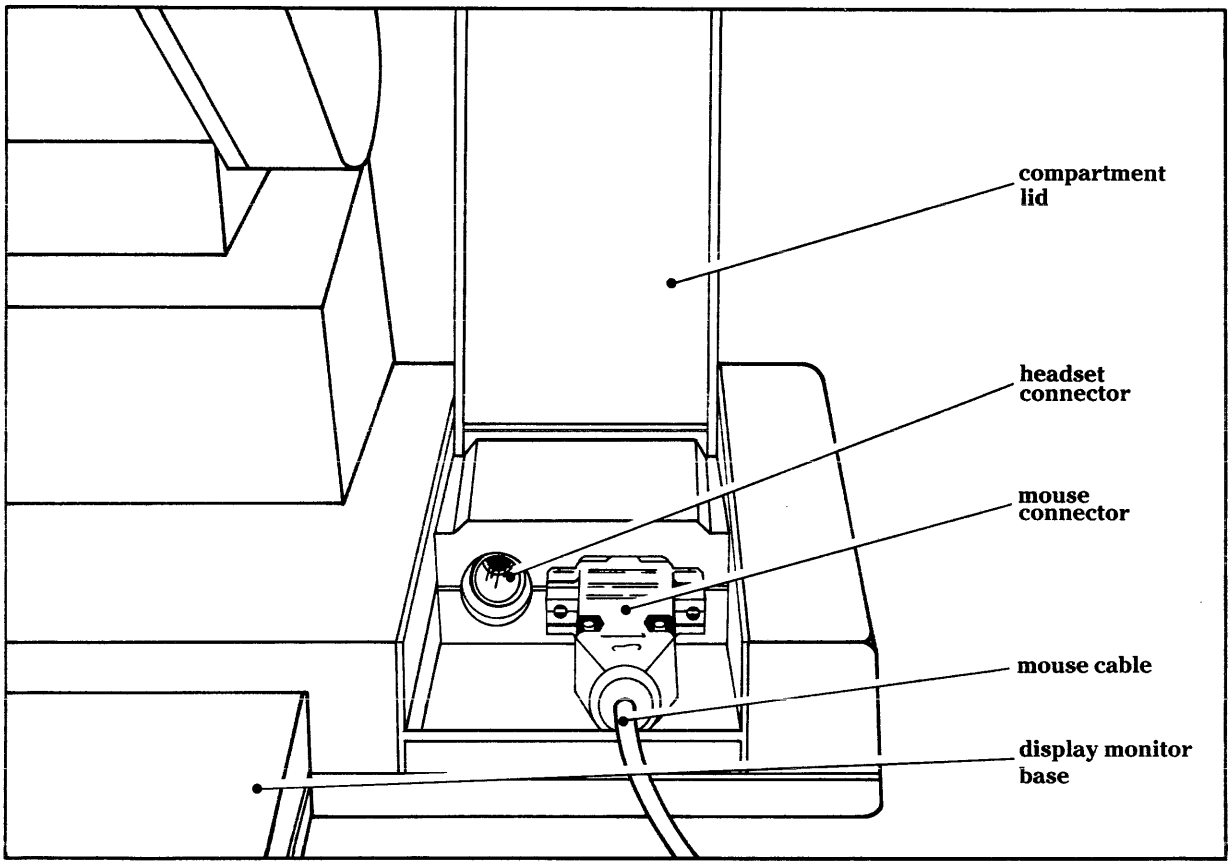
**Figure 2-5 Keyboard Connector**



**Mouse Connection**

**2.3.2** The mouse cable connects to the connector (Figure 2-6) located on the right side of the display monitor base assembly. The connector can be accessed by lifting up the compartment door. The mouse cable connects to the outer connector. The other connector in the connector slot is for future headset use. The compartment door should be closed after the cable is connected.

**Figure 2-6 Mouse Connector**



# OPERATION 3

**Highlights of This Section**

This section provides information on the operation, adjustment, and preventive maintenance for the display unit.

- Controls
- Display monitor adjustment
- Keyboard adjustment
- Power-up and power-down procedures
- Mouse operation

## Display Controls

**3.1** Figure 3-1 shows the controls on the display monitor. Table 3-1 explains the international symbols located on the display monitor. The display monitor controls are the on/off switch, the brightness control, the contrast control, and the volume control.

**Figure 3-1 Display Monitor Controls**

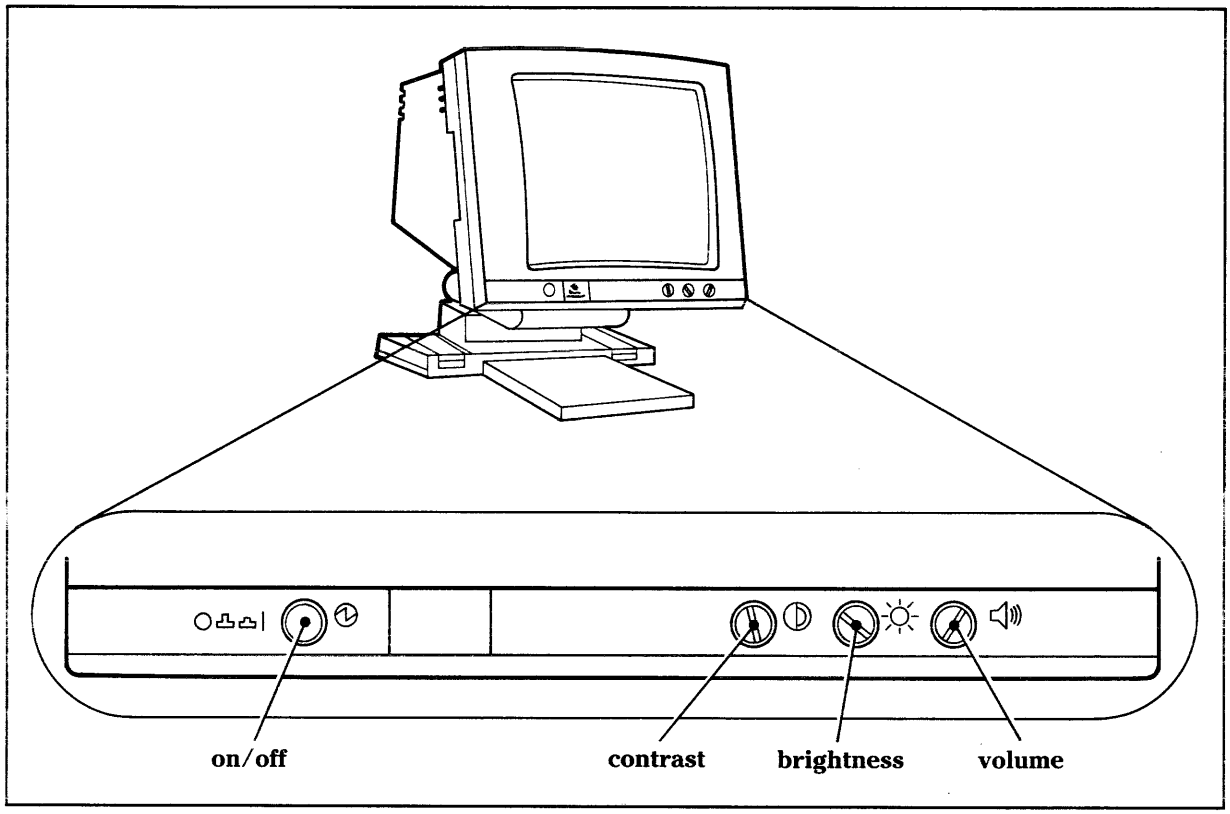


**Table 3-1 International Symbols**

| *Symbol* | *Meaning* |
|---|---|
|  | The out position of a switch is off, as indicated by the internationally accepted 0 (zero) symbol. |
|  | The in position (depressed) position of a switch is on, as indicated by the international 1 (one) symbol. |
|  | This is the international lightning bolt symbol for ac power, and identifies the ac power on/off (1/0) control. |
|  | The circle with a half cut away symbolizes the separation between light and dark (contrast control). |
|  | This is the sun symbol that identifies the brightness control. |
|  | This is the loudspeaker symbol that identifies volume control. |

**On/Off Switch**

**3.1.1** The on/off switch is a two-position switch. When the switch is in the out (0) position, power is removed from the display monitor. When the switch is pushed in (1), power is applied to the display monitor. See Figure 3-1 for the on/off switch location.

**Brightness**

**3.1.2** The normal operating mode for the display monitor displays dark characters on a white background. When turned clockwise, the brightness control increases the brightness of the white background. Brightness and contrast interact and can require several adjustments for optimum picture quality. See Figure 3-1 for the brightness control location.

**Contrast**

**3.1.3** The contrast control, when turned clockwise, increases the contrast between the black characters and the white background. The contrast and brightness settings interact. See Figure 3-1 for contrast control location.

**Volume**

**3.1.4** The volume control, when turned clockwise, increases the audio output of the display monitor speaker. See Figure 3-1 for the volume control location.

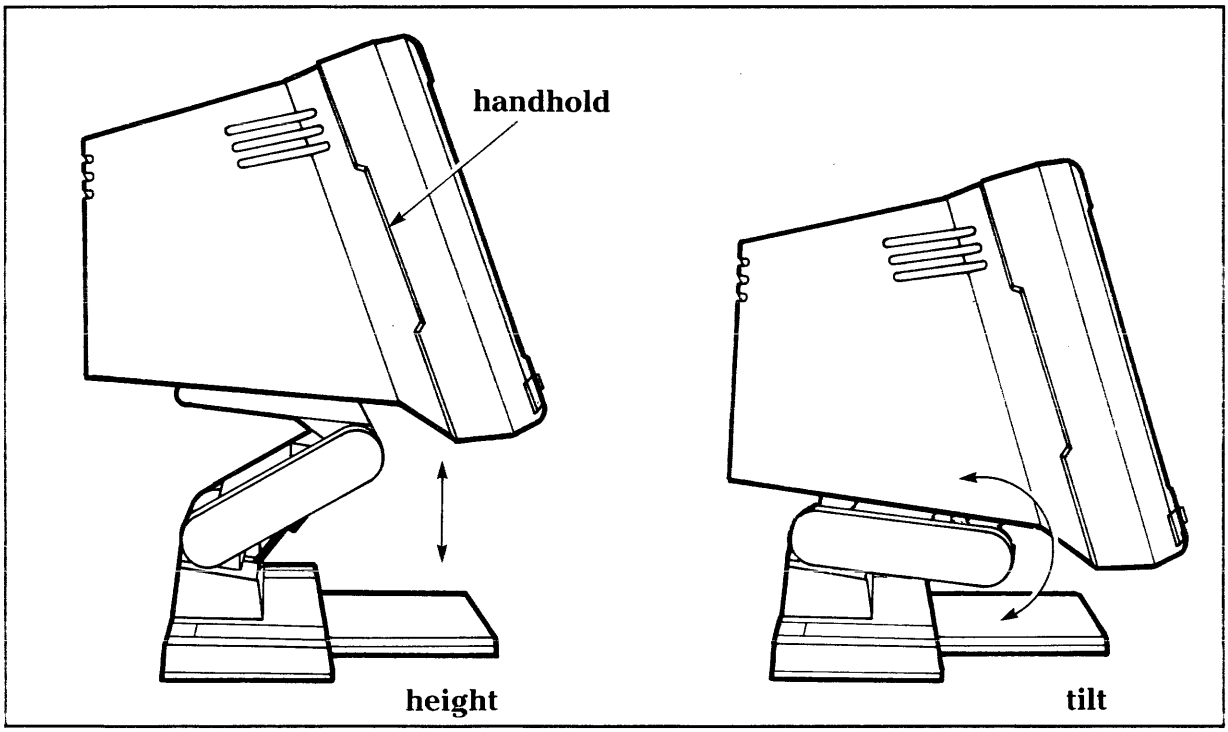
## Adjustments

**3.2** The display monitor and keyboard are easily adjustable for operator convenience. The following paragraphs describe the procedures for adjusting the display monitor and the keyboard.

### Display Monitor

**3.2.1** The monitor height adjustment is accomplished by holding the outer edges of the display monitor cover and pulling up to the desired position. The vertical tilt adjustment is accomplished by holding the outer edge of the display monitor cover and tilting to the desired position. See Figure 3-2 for display monitor positions. Rotation of the monitor can be accomplished by rotating the base.

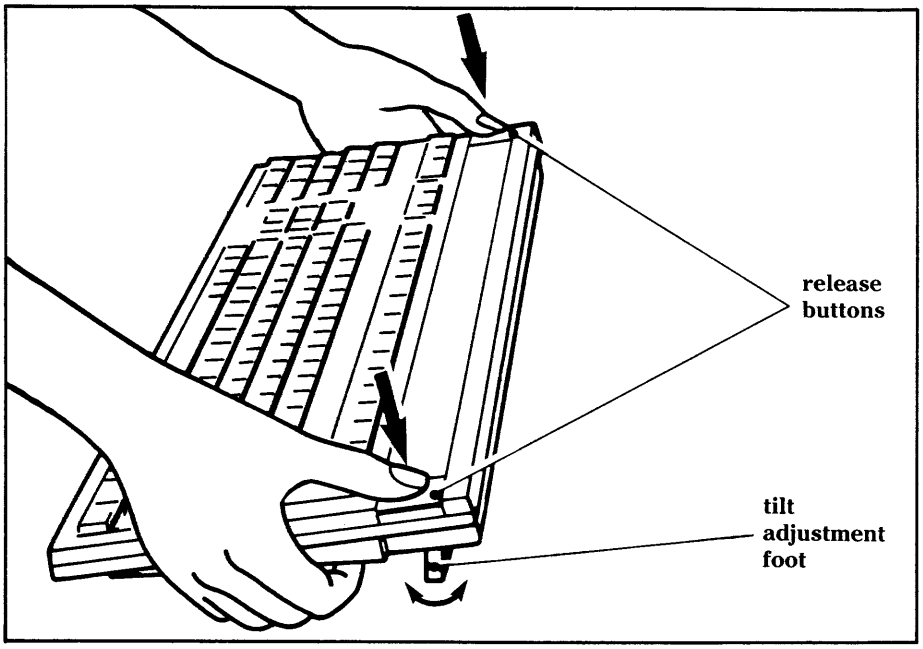
**Figure 3-2 Display Monitor Adjustment**




### Keyboard

**3.2.2** The height adjustment for the keyboard (see Figure 3-3) is accomplished by pressing down on both release buttons; setting the tilt adjustment foot to the desired position; and then disengaging the release buttons.

**Figure 3-3** **Keyboard Adjustment**




## Power-Up/ Power-Down

**3.3** The display unit can remain powered up at all times. The following paragraphs determine the procedure for powering up and powering down the display unit.

- If the display monitor is plugged into the auxiliary receptacles on the system enclosure, the display monitor power switch should remain on at all times. Power-up is executed when the system enclosure is powered up. Power-down of the display monitor is achieved by turning off the system enclosure power switch. System power-up and power-down are determined by the power source of the mass storage and display monitor.

- If the display monitor is plugged into a wall receptacle, the display monitor can be powered up or down prior to applying power to the system enclosure.

Each time power is applied to the system, the system performs a system reset. During the system reset process the system does the following:

- Performs hardware self-test and identifies the hardware components available to the system
- Prompts you to choose the load band and microcode
- Loads the current microcode into control memory on the processor board
- Loads the contents of the load band and the default image of the Lisp world, destroying any contents of virtual memory
- Performs other tasks as defined by an initialization list
- Brings up a program, by default a Lisp Listener

You can also reset the system by pressing and holding both CTRL keys, both META keys, and the ABORT key all at the same time. This process is called chording. For more information on the booting process refer to the *Explorer Operations Guide*.

## Keyboard

**3.4** The function of the keyboard depends upon the controlling input/output program running on the computer. The electronic lock indicators for the BOLD, CAPS, ITALICS, and MODE keys are software controlled. When any of these keys are set to the lock position, a light-emitting diode (LED) located on the selected key will illuminate to indicate the lock function is set. Pressing the key again will release the lock function and the LED will go out.

The automatic repeat function for the system is controlled by the system software. Whenever a key is held down, it continues to repeat until the key is released.

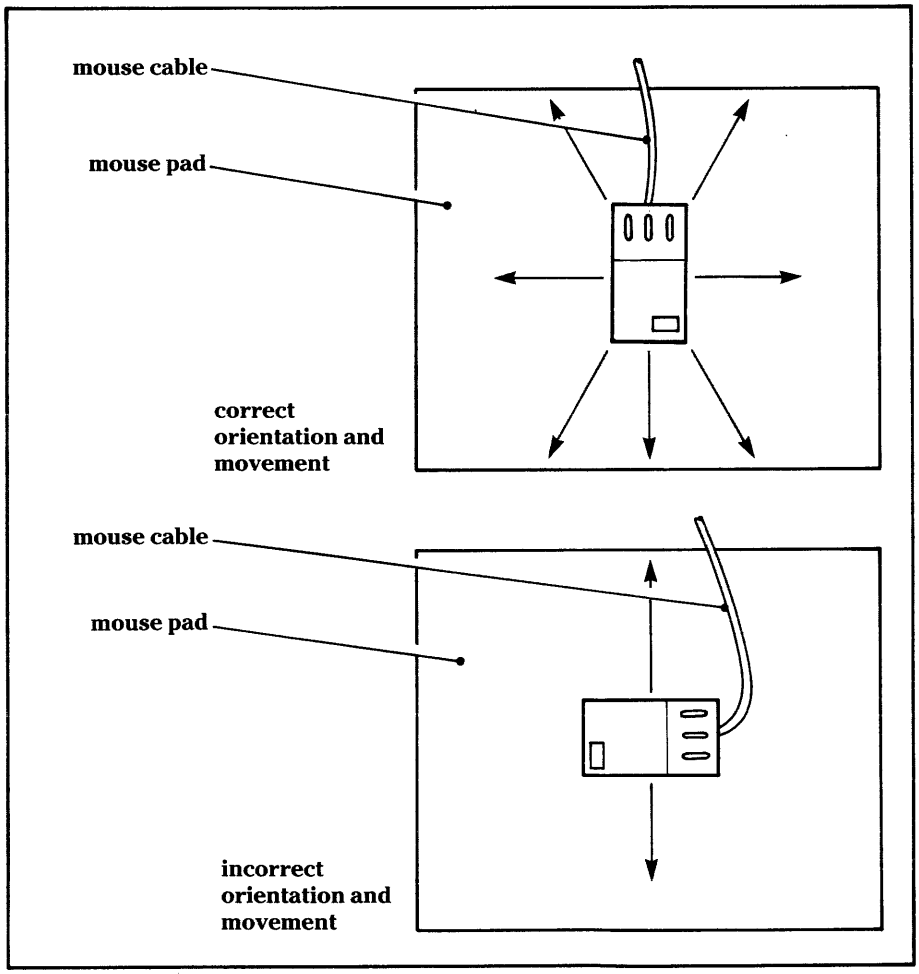
## Mouse

**3.5** Operation of the mouse is accomplished by moving the mouse over the optical pad. The optical pad is made up of a polished surface with grid lines that reflect the light from the mouse LEDs to a light detector located in the mouse. The detector then translates the light patterns into pulse signals, in a quadrature format, that are transmitted to the display monitor.

The relative motion of the mouse on the optical pad produces an equivalent position of the mouse cursor on the video display. The mouse must be oriented (Figure 3-4) on the optical pad with the narrow part of the mouse perpendicular to the widest part of the optical pad. Failure to maintain this orientation during movement of the mouse across the pad will result in erroneous mouse cursor motion on the video display.

The three key switches on the mouse can be pressed and released to select an item in a menu, request more information, or other operations as dictated by the operating system. A line of text at the bottom of the monitor called the mouse documentation line explains the current choices. Many applications have icons to represent operations or processes. The operation is selected by moving the mouse cursor to the icon and pressing a mouse switch.

**Figure 3-4** **Mouse-to-Pad Orientation**



## Preventive Maintenance

**3.6** The operator should wipe the display monitor and keyboard as required with a soft, clean, lint-free, noncotton cloth. The display cover should be wiped with a cloth dampened (not wet) with water as necessary to remove smudges, and so forth. The video display can be cleaned using a mild window cleaner with a lint-free cloth.

The anti-glare video display should be cleaned using a neutral cleaner (detergent) and a lint-free cloth. Several detergent cleaners are available and are acceptable for cleaning the video display.

---

**CAUTION: Do not use an acid or alkaline cleaner when cleaning the video display as this may damage the screen.**

---

The optical pad can be wiped down with a soft cloth, dampened with water, to remove smudges and fingerprints.

# SYSTEM DESIGN 4

**Highlights of This Section**

This section contains general information on the design of the Explorer display unit.

- Decription of the monitor interface board
- Description of the phase-locked loop board
- Description of the sound generator

## Display Unit

**4.1** Figure 4-1 is a simplified block diagram showing the interface between the display unit and the system interface board located in the 7-slot system enclosure. For more detailed information on the interface between the monitor interface board and the system interface board refer to the *Explorer System Field Maintenance* manual.

## Monitor Interface Board

**4.2** The monitor interface board provides an interface between the system enclosure and the display monitor by way of the fiber-optic cable. The monitor interface board provides the only signal communication between the system interface board (through the fiber-optic driver/receiver board) and the display monitor. Figure 4-2 is a simplified block diagram of the monitor interface board.

The monitor interface board contains a loopback feature. This loopback feature allows keyboard command data from the host to be sent to the monitor interface board and returned to the system interface board. This feature allows the entire fiber-optic data link to be tested by verifying that the data that was sent and received was correct.

The system interface board generates a channel B disconnect event if there is no downlink data from the monitor interface board. The presence of the downlink data assures that the fiber-optic cable is connected, the monitor power is on, and the monitor electronics are working. The system interface board continuously monitors the downlink data.

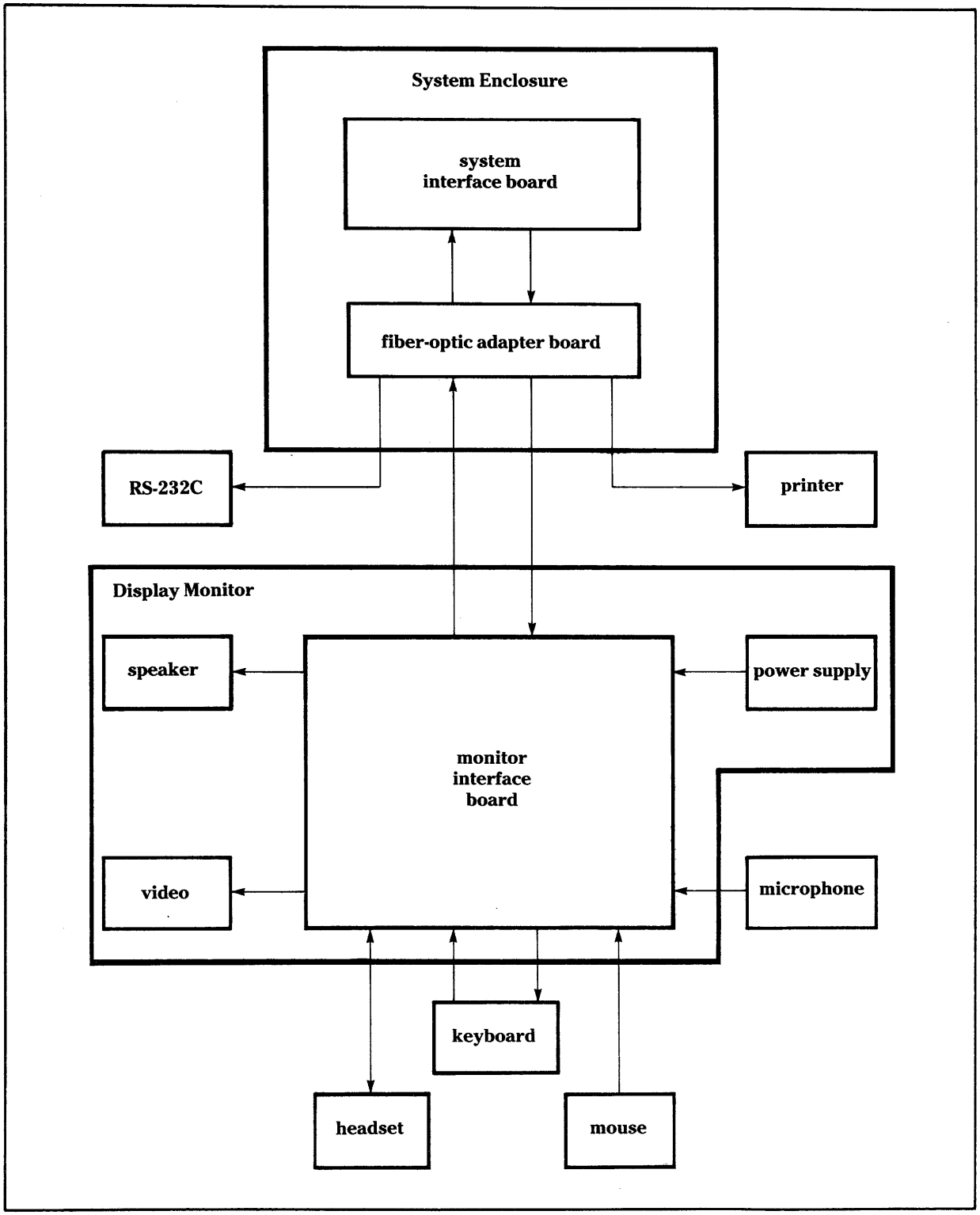
## Phase-Locked Loop Board

**4.3** The phase-locked loop (PLL) board is mounted on the monitor interface board. The PLL locks onto data frame synchronization patterns transmitted from the system interface board to the monitor interface board at the rate of one per scan line. The PLL output serves as a basic timing reference for data decoding and display synchronization. The PLL also serves as the timing reference for low-frequency data transmissions from the monitor interface board back to the system interface board. The PLL has a dc-restore circuit to recover and amplify optic signals on channel A.

## Keyboard Keycodes

**4.4** Table 4-1 lists the station and corresponding hexadecimal code for each key on the Explorer keyboard. The item following the station number is the key identification.

**Figure 4-1 Display Unit Simplified Block Diagram**



## Figure 4-2 Monitor Interface Board Simplified Block Diagram

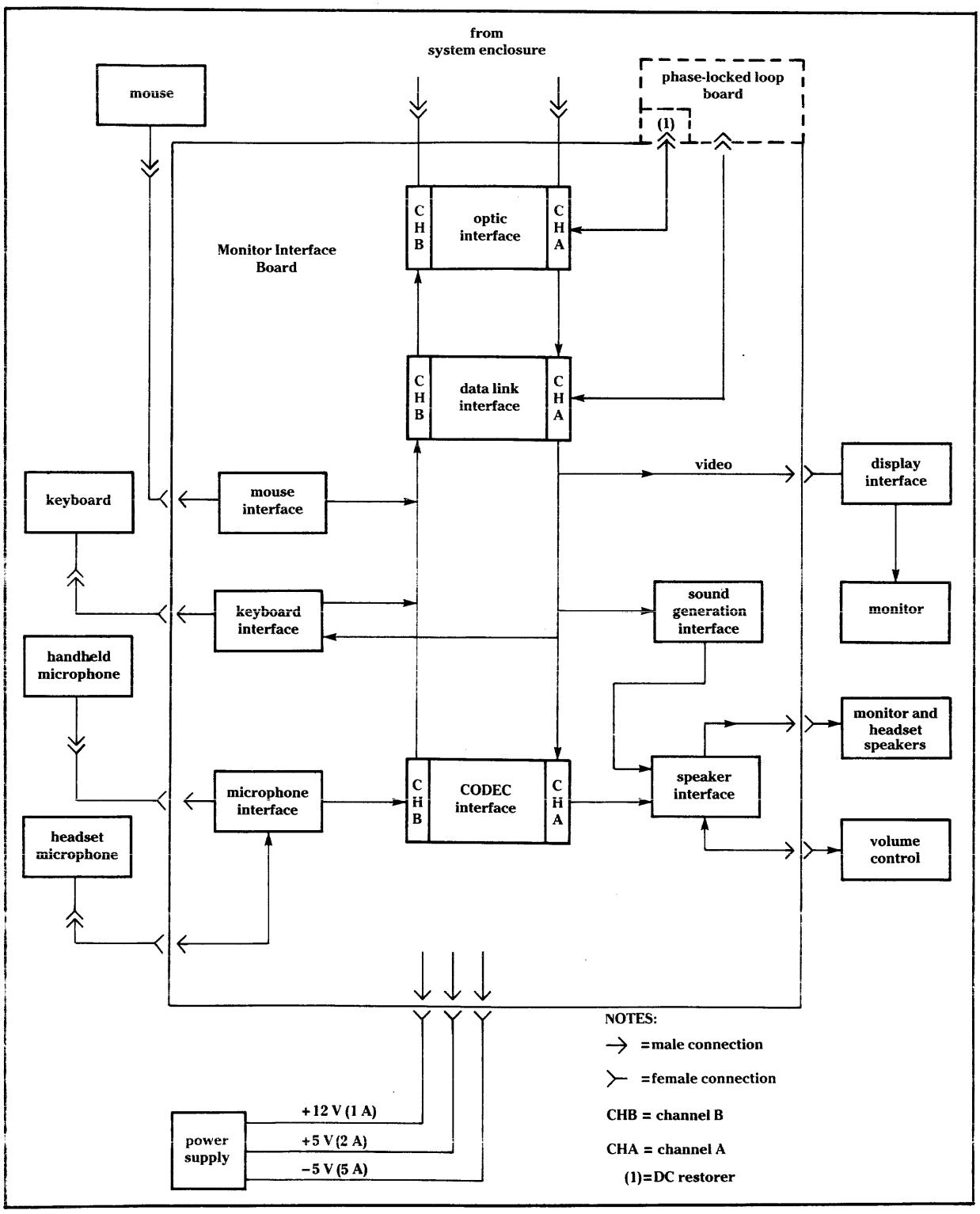


**Table 4-1 Keyboard Keycodes**

| *Station* | *Code (Hex.)* | *Station* | *Code (Hex.)* | *Station* | *Code (Hex.)* |
|---|---|---|---|---|---|
| 1-HELP | 01 | 45-0 ) | 2D | 89-: ; | 59 |
| 2- | 02 | 46- - | 2E | 90-" / | 5A |
| 3-SYSTEM | 08 | 47-+ = | 2F | 91-RETURN | 5B |
| 4-NETWORK | 09 | 48-{ \ | 30 | 92-LINE FEED | 5C |
| 5-STATUS | 0A | 49-}~ | 31 | 93-← | 5D |
| 6-TERM | 0B | 50-= | 32 | 94-blank | 5E |
| 7-HYPER | 07 | 51-+ | 33 | 95-→ | 5F |
| 8-CAPS LOCK | 03 | 52-SPACE | 34 | 96-4 | 60 |
| 9-BOLD LOCK | 04 | 53-TAB | 35 | 97-5 | 61 |
| 10-ITALIC LOCK | 05 | 54-BREAK | 36 | 98-6 | 62 |
| 11-MODE LOCK | 06 | 55- | 37 | 99-' | 63 |
| 12- | 0C | 56-TAB | 38 | 100- | 64 |
| 13-CLEAR SCREEN | 0D | 57-Q | 39 | 101- | 65 |
| 14-CLEAR INPUT | 0E | 58-W | 3A | 102-SYMB0L | 66 |
| 15-UNDO | 0F | 59-E | 3B | 103-SHIFT | 67 |
| 16-END | 10 | 60-R | 3C | 104-Z | 68 |
| 17-LEFT | 11 | 61-T | 3D | 105-X | 69 |
| 18-MIDDLE | 12 | 62-Y | 3E | 106-C | 6A |
| 19-RIGHT | 13 | 63-U | 3F | 107-V | 6B |
| 20-F1 | 14 | 64-I | 40 | 108-B | 6C |
| 21-F2 | 15 | 65-O | 41 | 109-N | 6D |
| 22-F3 | 16 | 66-P | 42 | 110-M | 6E |
| 23-F4 | 17 | 67-[ ( | 43 | 111-< , | 6F |
| 24- | 18 | 68-] ) | 44 | 112-> . | 70 |
| 25- | 19 | 69- | 45 | 113-/ ? | 71 |
| 26-SUPER | 1A | 70-\| \ | 46 | 114-SHIFT | 72 |
| 27-META | 1B | 71-↑ | 47 | 115- | 73 |
| 28-CTRL | 1C | 72-7 | 48 | 116-SYMBOL | 74 |
| 29-CTRL | 1D | 73-8 | 49 | 117-↓ | 75 |
| 30-META | 1E | 74-9 | 4A | 118-1 | 76 |
| 31-SUPER | 1F | 75-- | 4B | 119-2 | 77 |
| 32-HYPER | 20 | 76-ABORT | 4C | 120-3 | 78 |
| 33-RESUME | 21 | 77- | 4D | 121- | 79 |
| 34- | 22 | 78- | 4E | 122- | 7A |
| 35-ESCAPE | 23 | 79-RUBOUT | 4F | 123-(space bar) | 7B |
| 36-1 ! | 24 | 80-A | 50 | 124- | 7C |
| 37-2 @ | 25 | 81-S | 51 | 125-0 | 7D |
| 38-3 # | 26 | 82-D | 52 | 126-. | 7E |
| 39-4 $ | 27 | 83-F | 53 | 127-ENTER | 7F |
| 40-5 % | 28 | 84-G | 54 | | |
| 41-6 | 29 | 85-H | 55 | | |
| 42-7 & | 2A | 86-J | 56 | | |
| 43-8 * | 2B | 87-K | 57 | | |
| 44-9 ( | 2C | 88-L | 58 | | |

**NOTE:**
Code 80 Hexadecimal is added to each code to indicate the key closure transmission.

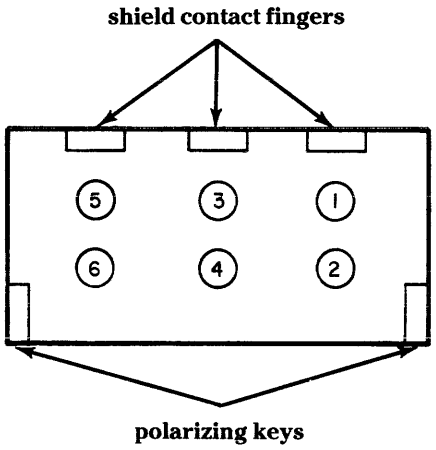
## Connector Pin Assignments

**4.5** The following paragraphs describe the pin assigments for the mouse and keyboard cables.

### Keyboard

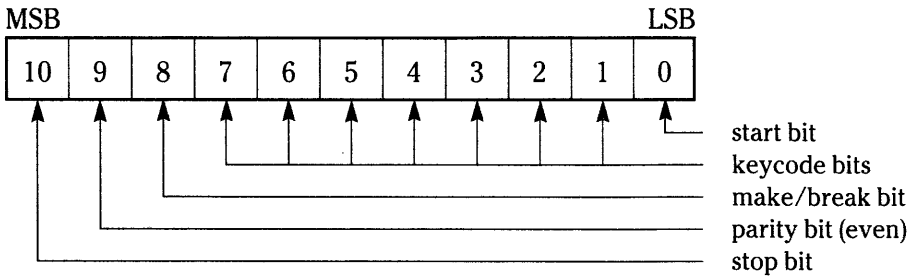
**4.5.1** The interface to the keyboard consists of two signal lines, input and output, and power. Figure 4-3 shows the signals for the keyboard. The keyboard input to the monitor interface board is an 11-bit serial data stream at 2400 baud. The start bit is 0, which is sent first, and the stop bit is 10. Refer to Figure 4-4 for a breakdown of the 11-bit send code and to Figure 4-5 for the 11-bit receive code.

**Figure 4-3** **Keyboard Connector Pin Assignment**



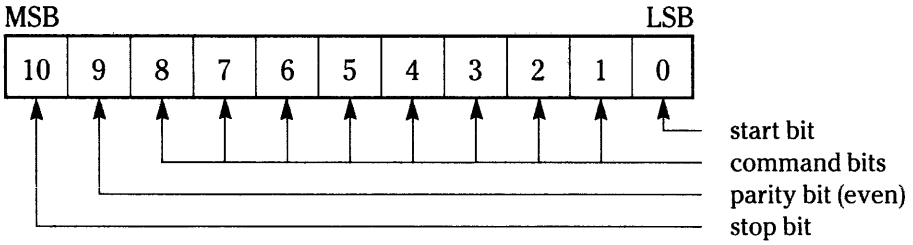

| Pin | Signal | Description |
|---|---|---|
| 1 | | +12 Vdc 450 mA |
| 2 | CRXD– | keyboard transmit data |
| 3 | CTXD– | keyboard receive data |
| 4 | CLOP– | loopback data to system (not used) |
| 5 | | signal/power ground |
| 6 | | signal/power ground |
| shield | | chassis ground |

**Figure 4-4** **Keyboard Data Format — Send From Keyboard**




**NOTES:**
MSB is the most significant bit.
LSB is the least significant bit.

**Figure 4-5** **Keyboard Data Format — Receive at Keyboard**

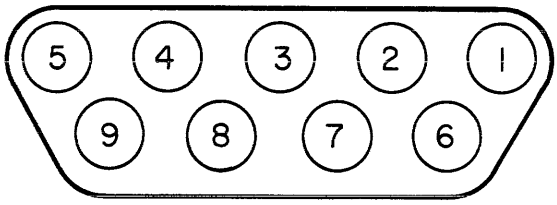



**NOTES:**
MSB is the most significant bit.
LSB is the least significant bit.

**Mouse**

**4.5.2** The signals and pin numbering for the mouse are listed in Figure 4-6. The shield is connected to chassis ground on the display unit.

**Figure 4-6** **Mouse Connector Pin Assignment**




front view

| Pin | Pin Signal |
|---|---|
| 1 | +5 Vdc 250 mA |
| 2 | XA (CMXA) |
| 3 | XB (CMXB) |
| 4 | YA (CMYA) |
| 5 | YB (CMYB) |
| 6 | left key (CLKEY–) |
| 7 | middle key (CMKEY–) |
| 8 | right key (CRKEY–) |
| 9 | signal/power ground |
| shield | chassis ground |

## Sound Generator

**4.6** The following provides a general description of the sound generator of the display unit. For more detailed information refer to the *Explorer System Field Maintenance* manual.

The sound generator consists of three separate tone generators, each with a programmable frequency divider and a programmable output attenuator. The sound generator operates on a clock frequency of 2.048 megahertz. Each of the tone generators includes a programmable 10-stage register that determines the output frequency in terms of the clock frequency. The sound generator also has a noise generator that produces white noise or periodic noise. The internal summing junction adds three tone components and one noise component to produce the audio ouput.

# INDEX

## M



## N



## O



## P



## R



## S



## T



## V

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