

# **DBS 16**

**USER'S MANUAL**

## DBS 16 USER'S MANUAL

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# DBS 16 USER'S MANUAL

## PREFACE

### PURPOSE AND SCOPE

The DBS 16 User's Manual introduces you to the DBS 16 microcomputer system, the latest addition to the DBS International INC. family of reliable and cost-effective desktop microcomputers. The manual is an instructional guide, written specifically for the user with limited experience in desktop microcomputer operations.

The intent of this manual is to provide all the information you need to effectively operate the DBS 16 system. However, you should be somewhat familiar with basic microcomputer equipment and its terminology; e.g., floppy disk(ette), VDT, and keyboard. If not, simply refer to the glossary of these and other related terms at the end of the manual.

### MANUAL ORGANIZATION

The manual is divided into the following sections:

#### Section 1 - DBS 16 System Overview

This section familiarizes you with the overall characteristics of the DBS 16 system. It describes the physical components, functionality, and capabilities of the system. Also explained are the operating systems available for running the DBS 16.

#### Section 2 - Installation

This section describes how to unpack and install the basic components of the system. Also included is a checklist for finding the optimum location for your system.

#### Section 3 - System Power-Up/Shutdown

This section explains how to power-up (turn on) and initialize the system. It also explains how to shutdown (turn off) the system at the end of the day. Included as well is information on power-up diagnostics and how to access the system.

## **Section 4 - System Operation**

This section provides additional information on the floppy and Winchester disk drives, including instructions for handling and protecting diskettes. Various system functions, such as diskette formatting, are also explained. Reference is also made to the DBS 16 System Reference manual that is applicable to the operating system you are using. Refer to the appropriate manual for details on all of the operating system utilities (commands).

## **Section 5 - System Check**

This section contains instructions for troubleshooting the system in the event of a power-up failure, system fault, or any other functional problem occurring during daily operations.

## **Appendix A - DBS 16 System Specifications**

This appendix lists the features (standard and optional) of the DBS 16 system.

## **Appendix B - DS 81 Display Terminal Guide**

This appendix describes the features and functionality of the Video Display Terminal and keyboard. It also includes instructions for installing the DS 81 VDT on the DBS 16, and detailed operational information.

## **Glossary of Related Terms**

The glossary lists and defines microcomputer and related terminology in alphabetical order. You may find it helpful to look through it before reading the rest of the manual.

## **RELATED READING**

If you want more information regarding the operation of the DBS 16 system, refer to any of the following manuals, which are available through your computer dealer:

1. DBS 16 Hardware Description and Maintenance Manual
2. DBS 16 CP/M-86 System Reference Manual
3. DBS 16 MP/M-86 and DBS-Net Systems Reference Manual
4. DBS 16 MS-DOS System Reference Manual

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SECTION 1  
DBS 16 SYSTEM OVERVIEW

**1.1 INTRODUCTION**

Section 1 is a detailed overview of the DBS 16 system. It describes the basic physical characteristics, functional aspects, and additional capabilities of the system, and also outlines the applicable operating systems (software) that control all DBS 16 operations.

**1.2 SYSTEM DESCRIPTION**

The DBS 16 is a 16-bit, multi-user, multi-tasking, multi-processor microcomputer system. The two basic components of the DBS 16 system are:

1. A Video Display Terminal with keyboard
2. The Desktop Unit

The Desktop Unit houses the system electronics and two disk drives.

An optional third component is the Expansion Box. The Expansion Box can be added to your basic system when you need to install five or more display terminals, or if you want to install multibus boards for advanced computer performance. When in use, the Expansion Box is connected to the Desktop Unit to form the Stack (see Figure 1-1).

The Intel 80186 microprocessor used in the DBS 16 enables 16-bit operation. The Desktop Unit and Expansion Box can be used for single-user and multi-user operations. An operating system makes the DBS 16 system multi-tasking, allowing you to perform several operations concurrently at one terminal. The number of operations that can be performed depends on the amount of memory available for the operation. The Expansion Box, when installed to form the Stack, makes the DBS 16 a multi-processor system, because it allows for additional microprocessors.

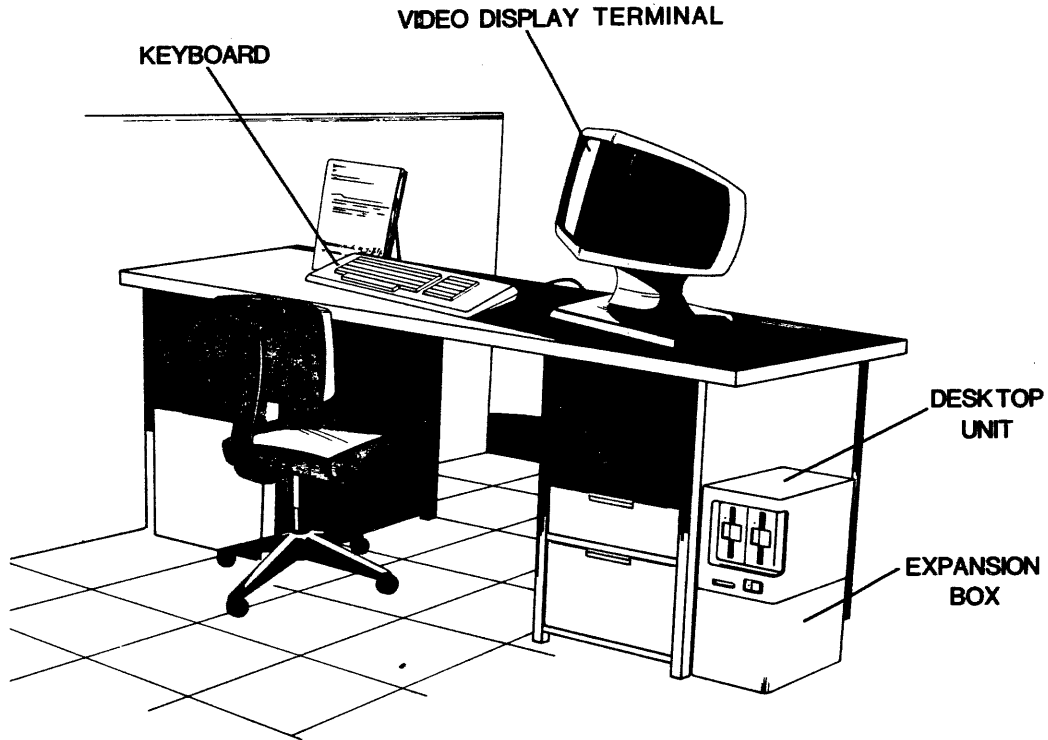


Figure 1-1. DBS 16 System Components

You have a choice of any of three system configurations, to easily conform the DBS 16 to your business needs.

You can start with the Single-User system configuration, and when more terminals are needed, expand to the Multi-User system. When more users and increased processing speed are needed, you can easily expand the configuration to the Multi-Processor Stack system.

The advanced technology and performance capability of the DBS 16 are clearly represented in each system configuration. This, as well as the versatility of the system, becomes more evident as you expand the system from one configuration to another.

### 1.2.1 The Single-User System

The two basic DBS 16 components are used in the Single-User system configuration. Only one display terminal can be connected to the Desktop Unit (see Figure 1-2). Either of two operating systems, CP/M-86 or MS-DOS, can be used in single-user operation. Refer to the DBS 16 CP/M-86 System Reference Manual and the DBS 16 MS-DOS System Reference Manual for detailed information on each.



Figure 1-2. Single-User System

### 1.2.2 The Multi-User System

The basic DBS 16 components are also used in the Multi-User system configuration. This configuration allows you to connect up to four display terminals to the Desktop Unit (see Figure 1-3). The MP/M-86 operating system is required when operating more than one display terminal. The operating system allows for multiple terminals to be added in this expanded system. Although MP/M-86 is required for multi-user operation, it can still be used in single-user operation. Refer to the DBS 16 MP/M-86 and DBS-Net Systems Reference Manual for detailed information.

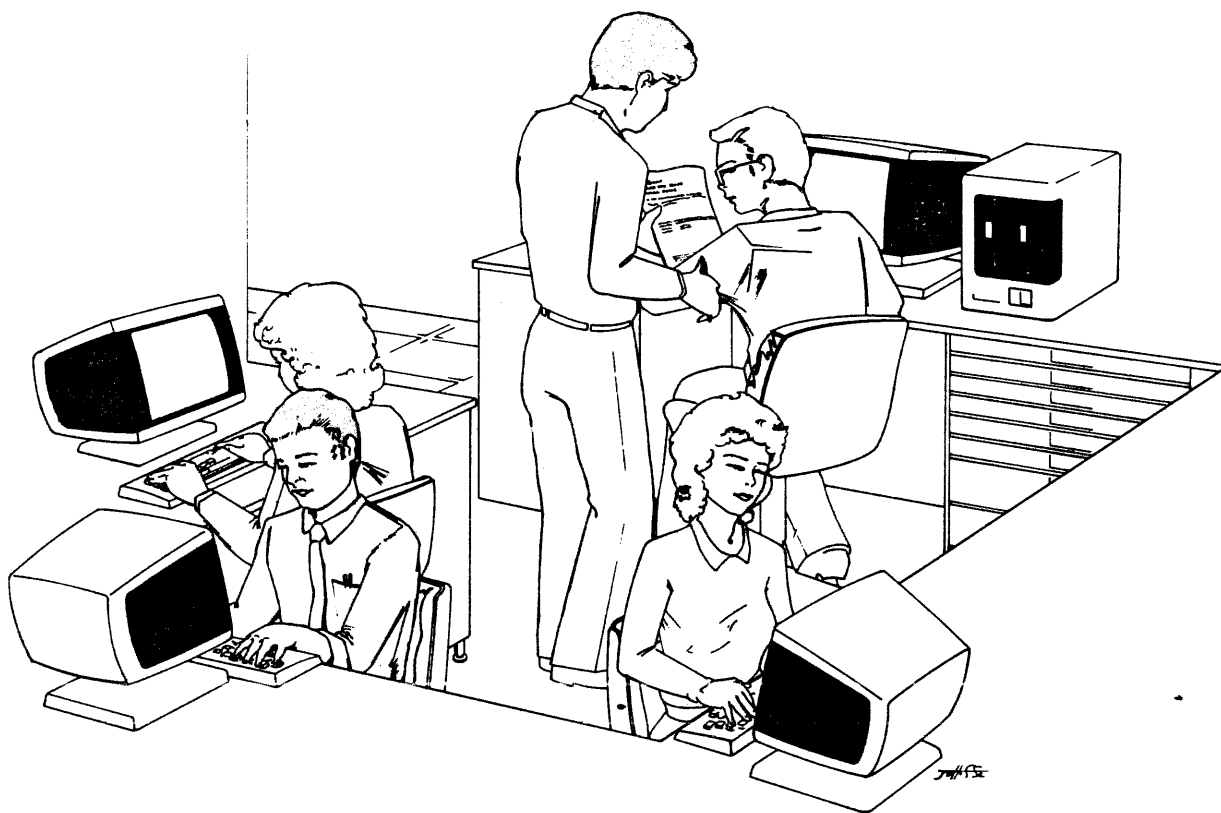


Figure 1-3. Multi-User System

### 1.2.3 The Multi-Processor Stack System

The Expansion Box is used with the basic DBS 16 components in the Multi-Processor Stack system configuration. In this setup, the Desktop Unit can no longer be used for connecting display terminals. Those terminals must be connected to the Expansion Box. This configuration allows you to connect a maximum 16 terminals (see Figure 1-4). The Expansion Box contains six multibus card slots. Any of the six slots can be reserved for DBSI Slave CPU boards or multibus boards. You can connect from one to four display terminals to each Slave CPU board for a total of up to 16 terminals in the system.

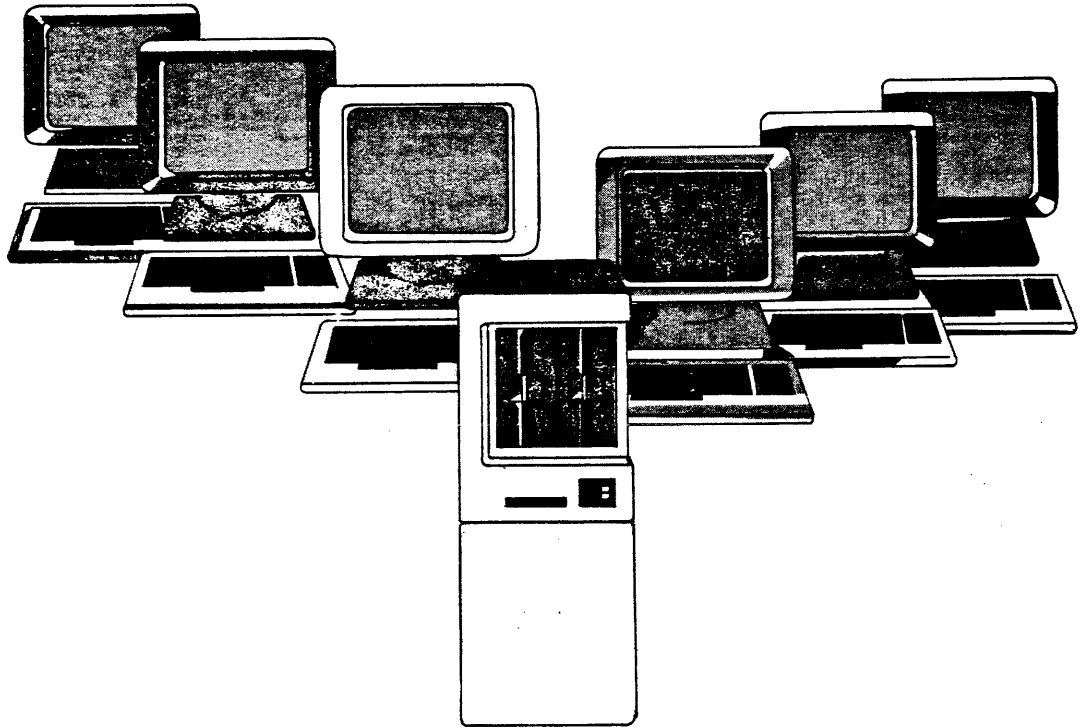


Figure 1-4. Multi-Processor Stack System

The MP/M-86 and DBS-Net operating systems are required to operate in the Multi-Processor Stack system configuration. This is the same MP/M-86 operating system used in the Multi-User system. However, it must be run concurrently with DBS-Net. Refer to the DBS 16 MP/M-86 and DBS-Net Systems Reference Manual for detailed information on both operating systems.

### **1.3 DBS 16 COMPONENT DESCRIPTIONS**

The following paragraphs describe the physical aspects of all the DBS 16 system components.

#### **1.3.1 The Video Display Terminal**

The Video Display Terminal basically consists of a CRT screen and typewriter-style keyboard with alphanumeric keys. Refer to the Terminal Guide in Appendix B at the back of this manual for a detailed description of the DS 81 Video Display Terminal. Consult your computer dealer if you will be using a different model display terminal.

#### **1.3.2 The Desktop Unit**

The Desktop Unit (part of the Stack) is available in two disk drive models: either two floppy drives, or one Winchester drive/one floppy. Also contained within this unit are the Master CPU board with Intel 80186 microprocessor, a 100 Watt power supply, a disk drive controller (if required), and a 5-inch fan.

##### **Floppy Disk Drive**

This disk drive holds one floppy (flexible) disk, 5-1/4 inches in diameter, double-density, double-sided, with either 48 or 96 tracks per inch (TPI).

##### **Winchester Drive**

This disk drive contains hard, non-removable, vacuum-sealed disks with various data storage capacities, depending on the drive model purchased.

#### **1.3.3 The Expansion Box**

The optional Expansion Box (part of the Stack) is a MULTIBUS structure (card cage) containing six card slots for DBSI Slave CPU boards and/or multibus boards, a 130 Watt self-contained power supply, and a 5-inch fan.

## 1.4 OPERATING SYSTEM SOFTWARE

An operating system is composed of a group of correlative computer programs, commonly referred to as software, that control system operations. These programs enable the user to perform certain operations on the system (i.e., read, create, edit, and delete files).

There are four operating systems that run on the DBS 16. Each is contained on a diskette. They are as follows:

1. CP/M-86
2. MS-DOS
3. MP/M-86
4. MP/M-86 and DBS-Net

There is a special configuration program that each operating system automatically executes the first time that you power-up the system. This program makes the operating system compatible with the type of system you are using.

CP/M-86 and MP/M-86 were originally designed by Digital Research. DBSI has enhanced them to run on the DBS 16.

MS-DOS was originally designed by Microsoft Inc. It too has been enhanced by DBSI to run on the DBS 16.

DBS-Net was designed by DBSI to run concurrently with MP/M-86 on the DBS 16, when DBSI Slave CPU boards are used.

CP/M-86 is the standard operating system provided with the DBS 16. You can obtain any of the other operating systems (in addition to CP/M-86) from your computer dealer. Refer to the specific DBS 16 System Reference manual for a detailed description of the operating system you are using.

SECTION 2  
INSTALLATION

**2.1 INTRODUCTION**

Section 2 describes how to unpack and install the basic components of the DBS 16 system. Also included are a checklist to assist you in finding the optimum location for your system, and descriptions of the connectors and controls on the component backpanels.

**2.2 UNPACKING THE DBS 16**

The DBS 16 system components and the Accessories Kit are shipped with packing material to fully protect them during travel. The system is designed to be reliable and durable. However, as with any computer system, it can malfunction if basic precautions are not taken. Therefore, it is recommended you decide on the best site for your system before unpacking it.

First, refer to Table 2-1, the DBS 16 Installation Site Checklist, and Table 2-2, the Line Voltage Setting Chart, to help you select a location in which to install the DBS 16. Then, carefully lift each component out of its carton and place it in that location. As you unpack the system, make sure that you have received all of the items listed here. Also inspect the components for damages.

1. Video Display Terminal(s)
2. Power cord for the display terminal
3. Detachable keyboard with coiled cable
4. Desktop Unit
5. One cable with an SDL 4-pin connector, and a 25-pin connector for each display terminal.  
(The cable is available in several lengths from your computer dealer.)
6. Expansion Box (optional purchase)
7. DBSI Slave CPU board(s), if ordered
8. DBS 16 Accessories Kit containing:
  - DBS 16 User's Manual
  - DBS 16 CP/M-86 System Reference Manual
  - DBSI CP/M-86 Operating System floppy disk
  - Power cord for the Desktop Unit



Contact your computer dealer if any one of the listed items is missing (including options, if ordered). Any damage sustained during shipment is the responsibility of the freight carrier. Contact the carrier immediately if there is any damage.

## 2.3 SELECTING THE BEST LOCATION

Besides using the DBS 16 Installation Site Checklist, also read carefully the following warning statement concerning electrical requirements when selecting a location for your DBS 16 system. Taking the proper precautions ensures that your system will function properly in an environment most suitable for sensitive computer equipment. The warning is quoted verbatim, as required by Federal law:

\* WARNING \*

(FCC Rule 79-556 14687 Appendix B)

THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTIONS MANUAL, MAY CAUSE INTERFERENCE TO RADIO COMMUNICATIONS. IT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR CLASS A COMPUTING DEVICES 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.

### 2.3.1 Checklist for the DBS 16 Installation Site

Check the following list to help you find the best location for installing the DBS 16. You should check off each item before attempting to install the system.

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**Table 2-1. DBS 16 Installation Site Checklist**

**1. Flat Surface?**

Find a stand, table or desk for the display terminal(s). If desired, place the Desktop Unit and the Expansion Box (optional) on the floor.

**2. Clean Environment?**

Make sure the area is clear of any of the following items, to ensure adequate ventilation for the system, and to prevent accidental spillage or damage to the system.

- . Heavy dust
- . Smoke
- . Food
- . Drink
- . Foreign objects (e.g., staples, paper clips)

**3. Humidity?**

The humidity level should be within the acceptable range of 20% to 90%.

- . Too much humidity interferes with system operation.
- . Too little humidity creates static, which also interferes with system operation.
- . Talk with your computer dealer to determine the acceptable humidity level for the area in which your system will be installed.

**4. Interference?**

Make sure the system is at least 15 feet from any of the following sources of interference:

- . Strong radio frequency
- . Magnetic fields; e.g., an office copier, a magnetic paper clip dispenser, or equipment with large motors

**5. Network and Power Cabling?**

Arrange with your computer dealer to have the cabling installed where it won't be stepped on, tripped over, or damaged.

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After finding the best location for the DBS 16, you'll want to decide on a convenient physical arrangement for your system. For instance, in an office environment the display terminal could be placed on a table or desk, with the Desktop Unit set to the left or right side of the display terminal (see Figure 2-1). There is no required arrangement for these two components of the DBS 16. If the display terminal must be situated farther than 250 feet from the Desktop Unit or Expansion Box, you may need a modem eliminator or serial communication line driver.

As previously stated, the humidity level should be maintained within an acceptable range. Although the DBS 16 operates satisfactorily at lower humidity levels, static (i.e., from walking over the carpet) can cause interference when you touch the system. Precautionary measures, such as placing anti-static mats under each operator's table and chair, can reduce or eliminate this type of interference.

When you have finished setting up your system, set the appropriate line voltage with the correct fuse for your locale by using the Line Voltage Setting Chart in the following paragraph.



Figure 2-1. DBS 16 Layout: Representative Illustration

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**2.3.2 Setting the Line Voltage**

The DBS 16 requires a steady supply of 115 Vac, 60 Hertz (domestic) at 1.5 Amps or 230 Vac, 50 Hertz (international) at 0.75 Amps. Incorrect or fluctuating line voltages can cause disk read or write errors and damage to the components. If you have any doubts about the line voltages at your location, contact your computer dealer before proceeding with the installation.

The two-position line voltage select switches at the rear of the Desktop Unit (see Figure 2-3), and at the rear of the Expansion Box (see Figure 2-4) are used for setting the line voltage for the entire DBS 16 system. Note that both line voltage switches must be in the same position to receive the appropriate line voltage.

**Table 2-2. Line Voltage Setting Chart**

<b>Line Voltage Select Position</b>	<b>Corresponds To Line Voltage</b>	<b>Use This Fuse</b>
Down	198 - 250V	2-Amp slow blow
Up	95 - 135V	2-Amp slow blow

**2.4 DESCRIPTIONS OF CONNECTORS AND CONTROLS**

It will be helpful for you to familiarize yourself with all of the connectors and controls on the specific display terminal you will be using, the Desktop Unit, and the Expansion Box (optional), before starting the installation procedure. Refer to the Terminal Guide in Appendix B at the back of this manual for detailed descriptions of the DS 81 display terminal. If you are using another display terminal, consult your computer dealer. The Desktop Unit and the Expansion Box are described in paragraphs 2.4.1 and 2.4.2, respectively.

### 2.4.1 The Desktop Unit

The ON/OFF (I/O) power switch and power-on indicator light are on the front of the Desktop Unit (see Figure 2-2). (The power switch also relays power to the optional Expansion Box.) There are connectors and controls at the rear of the Desktop Unit (see Figure 2-3).

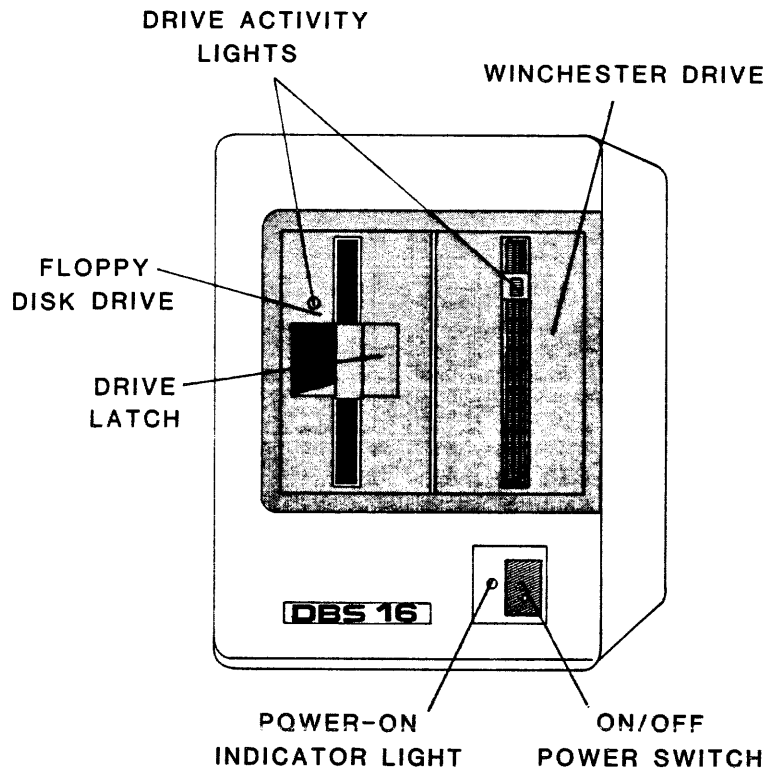


Figure 2-2. Desktop Unit: Front View

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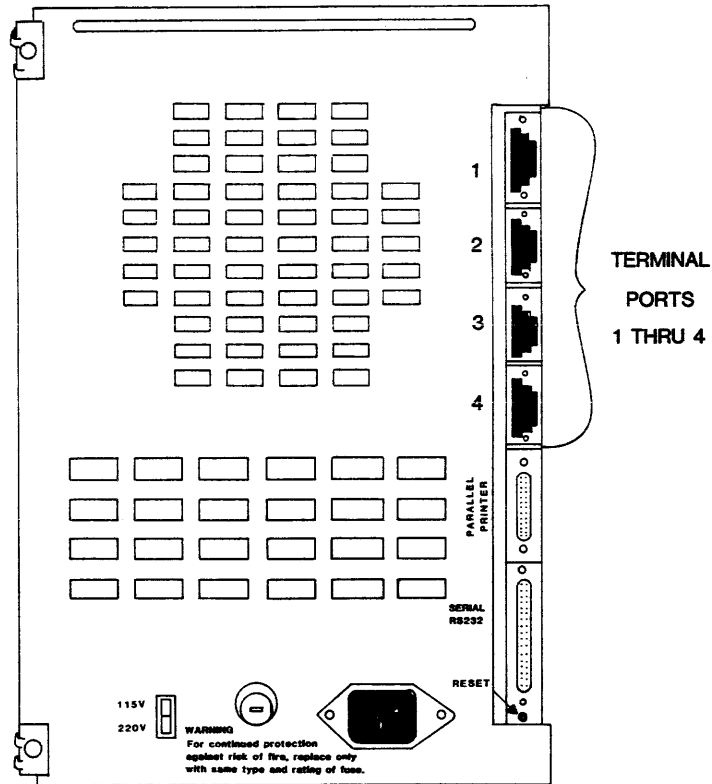


Figure 2-3. Desktop Unit: Rear View

The connectors and controls are described here:

- Terminal Ports:** #1#, #2#, #3#, #4# -- These ports are used to connect from one to four display terminals, or other desktop microcomputers.
- PARALLEL PRINTER Port:** This port is used to connect a Centronics-compatible parallel printer to the DBS 16. (The DBS 16 is compatible with most 8-bit parallel transmission printers.)
- SERIAL RS232 Port:** This port is used to connect a modem or serial printer to the DBS 16. It conforms to the EIA standards for serial interfacing between data terminal equipment and data communications equipment.

- RESET Switch: This switch is used to reinitialize the DBS 16.
- Power Cord Receptacle: This port is used for the power cord on the Desktop Unit.
- FUSE: This accepts a 2-Amp slow blow fuse.
- Voltage Selector Switch: This is a two-position switch that sets the line voltage for the DBS 16. It works in conjunction with the voltage switch at the rear of the Expansion Box.

### 2.4.2 The Expansion Box

There are six card slots inside the Expansion Box that are used for DBSI Slave CPU boards, or any other type of multibus board; i.e., Ethernet or a special peripheral controller. All six slots can be used for slave boards. Each slave board has four serial ports for terminal connections. However, if all six slave boards are used, only sixteen of the 24 available terminal ports can be used. There is an opening at the rear of the Expansion Box to route the cabling for the terminals (see Figure 2-4). The fuse, also located at the rear, is the same type used in the Desktop Unit.

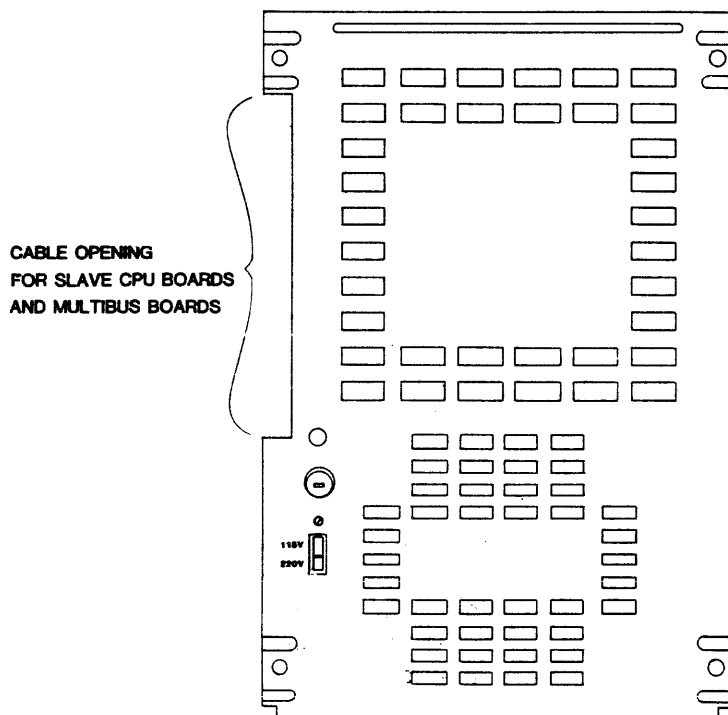


Figure 2-4. Expansion Box: Rear View

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## 2.5 INSTALLING THE DBS 16

The installation procedures for single-user and multi-user systems are basically the same. The only difference is in connecting additional display terminals to the Desktop Unit in a multi-user setup. The procedure is relatively simple. Just follow the instructions in paragraph 2.5.1, and repeat the appropriate steps, as indicated, when connecting each additional display terminal.

Also, refer to Appendix B, DS 81 Display Terminal Guide, at the back of the manual (or to your own terminal guide), for detailed instructions on installing your particular display terminal. The information is required to identify the appropriate ports during installation.

More detailed instruction is required to install the Multi-Processor Stack system. The procedure is explained, step-by-step, in paragraph 2.5.2. The major differences in installing this system, as opposed to installing the other two systems, are in connecting the Desktop Unit to the Expansion Box and then, connecting the display terminals to DBSI Slave boards in the Expansion Box, instead of to the Desktop Unit. Paragraph 2.5.3 explains the simple procedure for installing DBSI 8-bit and 16-bit desktop microcomputers.

### 2.5.1 Installing the DBS 16 Single- and Multi-User Systems

1. Make sure that the power is turned off on all components before starting the installation.

\* WARNING \*

TURN OFF THE POWER TO ALL COMPONENTS BEFORE YOU ATTEMPT TO CONNECT ANY CABLES. OTHERWISE, ELECTRICAL SHOCK CAN RESULT.

2. If applicable, plug the coiled cable attached to the keyboard into the appropriate port at the rear of the display terminal. Refer to Appendix B (or to the applicable terminal guide) for the correct port.
3. Plug the 25-pin connector end of the terminal cable into the appropriate serial port at the rear of the display terminal.
4. Plug the SDL 4-pin telephone-style connector end of the same terminal cable into the first (top) terminal port, labelled as 1, at the rear of the Desktop Unit (see Figure 2-5).



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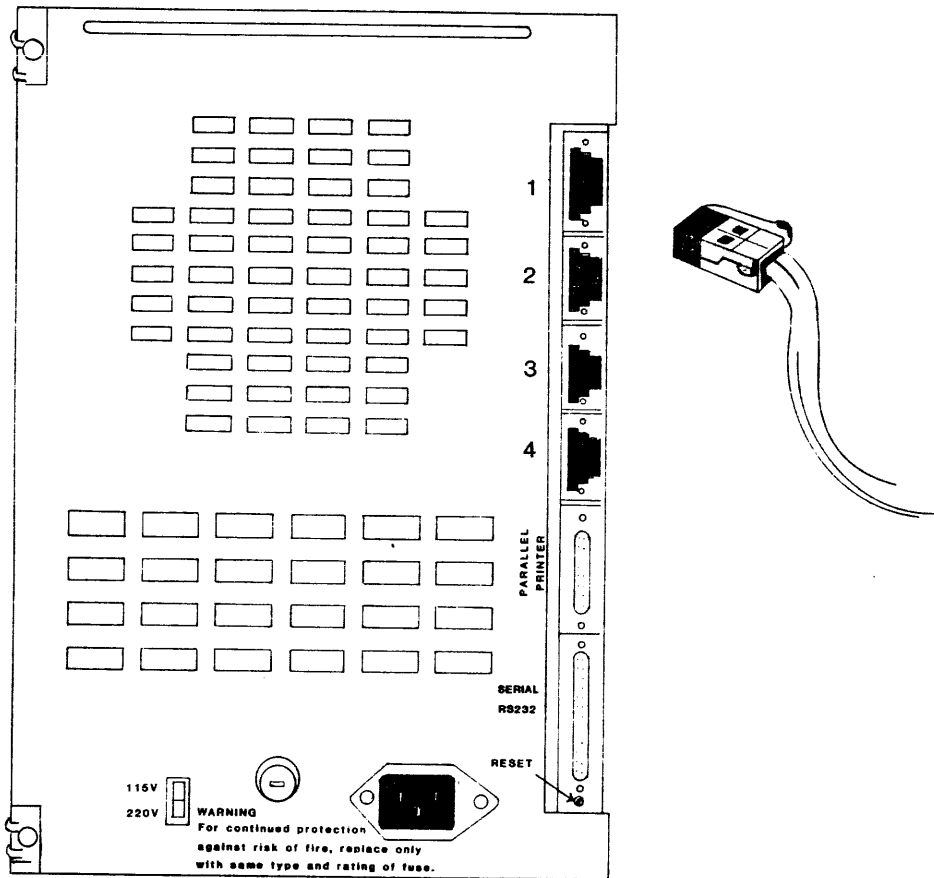


Figure 2-5. Connecting the First Terminal to the Desktop Unit

Repeat steps 1 through 4 for each additional display terminal that you install. There are three additional terminal ports; connect each terminal in sequence.

CAUTION

TURN OFF THE DISPLAY TERMINAL POWER SWITCH BEFORE PLUGGING THE POWER CORD FOR THE DISPLAY TERMINAL INTO AN AC OUTLET. OTHERWISE, THE TERMINAL COULD SUSTAIN DAMAGE.

5. Plug the female connector end of the display terminal power cord into the appropriate power receptacle at the rear of the display terminal, and also plug the male connector end of the cord into a three-prong wall receptacle, or other ac outlet, that has been properly grounded.

Repeat for each additional display terminal that you install.

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6. Plug the female connector end of the Desktop Unit power cord into the power receptacle at the rear of the Desktop Unit, and the male connector end of the power cord into a three-prong wall receptacle, or other ac outlet.

7. If desired, you can then install either a parallel or serial printer on the Desktop Unit.

If you install a parallel printer, the baud rate does not have to be set, because it is not used.

If you install a serial printer, use the CONFSIO utility/program to set the baud rate. Refer to the applicable DBS 16 System Reference manual for the operating system you are using. Also, refer to the appropriate printer manual for details on changing the baud rate for the printer.

8. If you are using a parallel printer, plug the 15-pin connector end of the printer cable into the **PARALLEL** port at the rear of the Desktop Unit.

Plug the 36-pin connector end of the same cable into the appropriate port at the rear of the printer.

9. If you are using a serial printer, plug either of the two 25-pin connector ends of the printer cable into the **SERIAL RS232** port at the rear of the Desktop Unit.

Plug the other 25-pin connector end of the same cable into the appropriate port at the rear of the printer.

10. Refer to Section 3 for the correct sequence to use when powering up the system.

### 2.5.2 Installing the DBS 16 Multi-Processor Stack System

1. Make sure the power is turned off on all components before starting the installation.

**\* WARNING \***

TURN OFF THE POWER TO ALL COMPONENTS BEFORE YOU ATTEMPT TO CONNECT ANY CABLES. OTHERWISE, ELECTRICAL SHOCK CAN RESULT.

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2. If applicable, plug the coiled cable attached to the keyboard into the appropriate port at the rear of the display terminal. Refer to the applicable terminal guide for the correct port.
3. Plug the 25-pin connector end of the terminal cable into the appropriate serial port at the rear of the display terminal.
4. Place the Desktop Unit on its left side, with the front facing you, on a clean, flat surface. DO NOT remove any of the side panels.
5. Remove the two adhesive-backed covers on the bottom of the Desktop Unit to expose the two connectors.
6. Turn the Expansion Box (viewed from the front) one-quarter turn to your right (clockwise) so that the right side is facing you. Remove the right panel by loosening the quarter-turn fasteners using a screwdriver. Carefully slide the panel to your right, and then lift it away from the box.
7. Place the Expansion Box on its left side so that the open right side is facing up.
8. Align the bottom of the Desktop Unit (still on its side) with the top of the Expansion Box (also on its side). Make sure the front of each unit is facing you (see Figure 2-6).
9. Gently push the two units together until the exposed connector on the PC board in the Expansion Box mates with the connector in the bottom of the Desktop Unit.
10. Carefully, but firmly, tighten the four captive screws in the top of the Expansion Box with your fingers or a screwdriver.
11. Take the 3-pin connector end of the attached power cable up through the top of the Expansion Box and connect it to the 3-pin connector in the bottom of the Desktop Unit. Note the arrangement of the pins in the connector to properly connect it.
12. Carefully stand both units up so that the Desktop Unit is on top of the Expansion Box.

There are six card slots in the Expansion Box for plugging in the DBSI Slave boards, and if desired, any other type of multibus board; i.e., a special printer or disk controller, Ethernet, or X.25.

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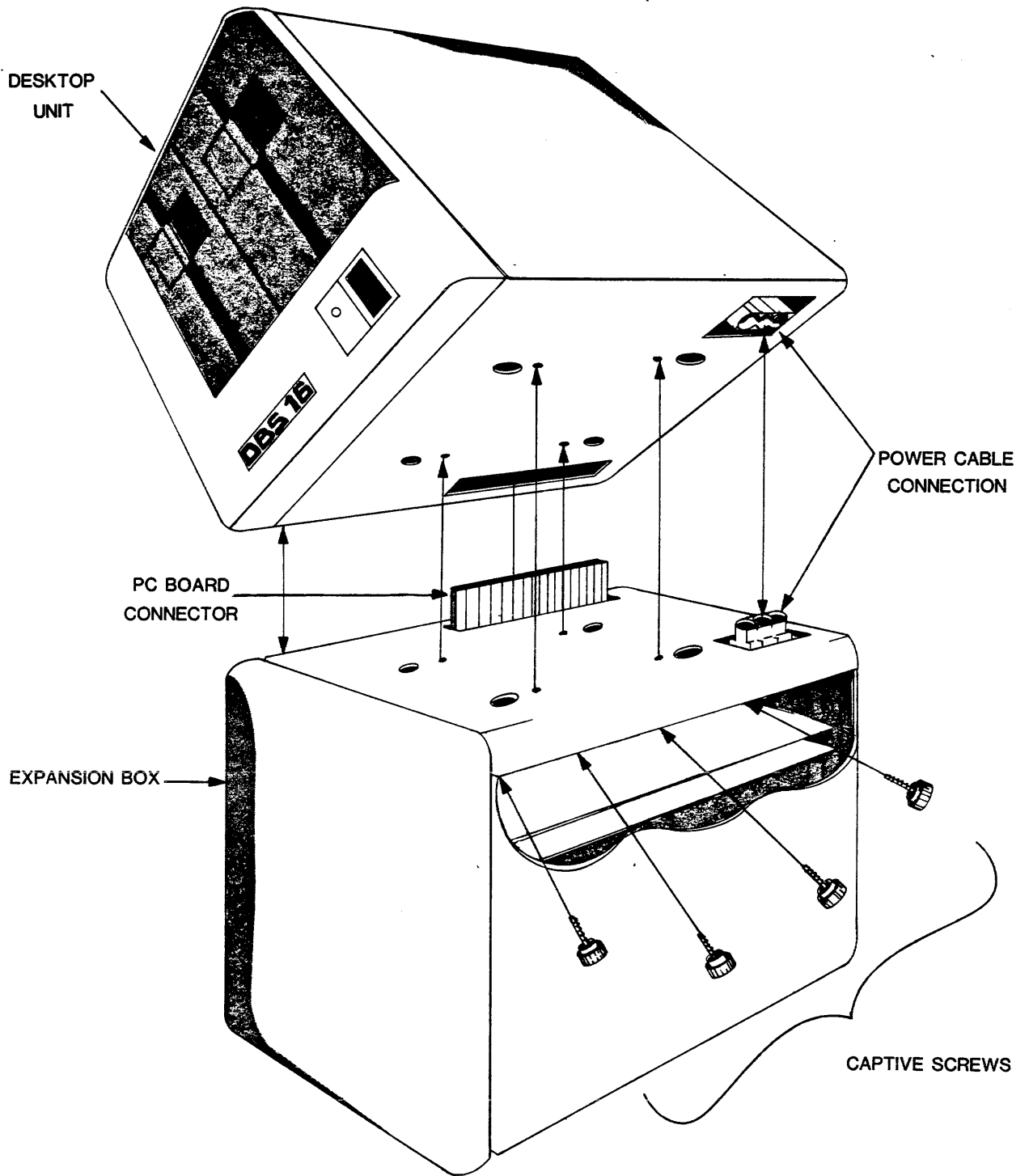


Figure 2-6. Connecting the Desktop Unit and the Expansion Box

13. Plug the SDL 4-pin connector end of the terminal cable (the same one referred to in step 3) into the first terminal port on one of the DBSI Slave boards in the Expansion Box (see Figure 2-7). The port is accessed via the rear of the box.

Repeat steps 1 through 3, and continue at step 13 for each additional display terminal that you install.

NOTE: If you have six slave CPU boards, each of which has four terminal ports, you can connect sixteen display terminals in any of the 24 available ports. Placement is flexible to balance processing resources among terminal users.

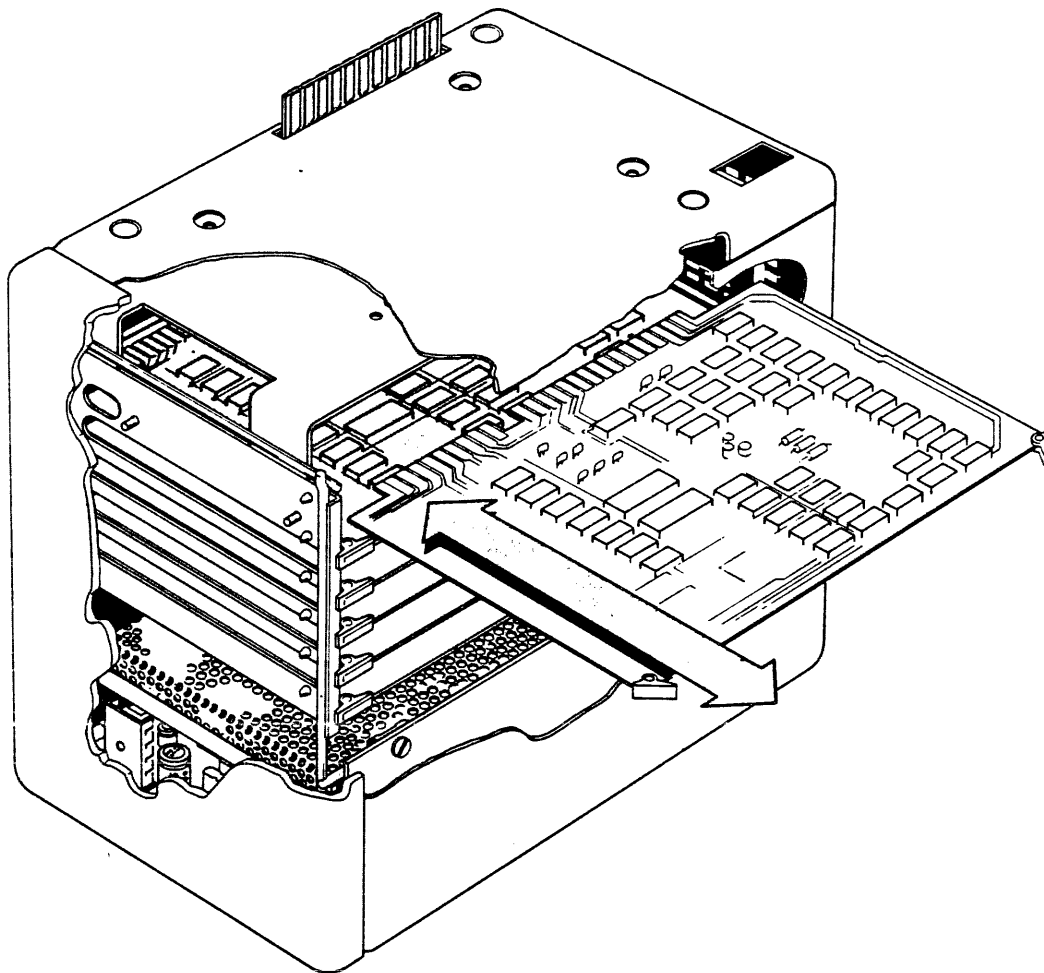


Figure 2-7. Installing the First Slave CPU Board  
in the Expansion Box

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14. Place the right panel back on the Expansion Box by simultaneously pushing and sliding it until it engages in the slots at the front, and the quarter-turn fasteners slip into their holes. Using a screwdriver, push and turn the fasteners to the right until resistance is felt.

CAUTION

TURN OFF THE DISPLAY TERMINAL POWER SWITCH BEFORE PLUGGING THE POWER CORD FOR THE DISPLAY TERMINAL INTO AN AC OUTLET. OTHERWISE, THE TERMINAL COULD SUSTAIN DAMAGE.

15. Plug the female connector end of the display terminal power cord into the appropriate power receptacle at the rear of the display terminal, and also plug the male connector end of the cord into three-prong wall receptacle, or other ac outlet that has been properly grounded.

Repeat for each additional display terminal that you install.

16. Plug the female connector end of the power cord for the Desktop Unit into the power cord receptacle at the rear of the Desktop Unit, and also plug the male connector end of the cord into a three-prong wall receptacle, or other ac outlet that has been properly grounded.

NOTE: The wall receptacle may be different in countries with 230V.

17. If desired, you can then install either a parallel or serial printer on the Desktop Unit.

If you use a parallel printer, the baud rate does not have to be set, because it is not used.

If you install a serial printer, use the CONFIO utility/program to set the baud rate. Refer to the applicable DBS 16 System Reference manual for the operating system you are using. Also refer to the appropriate printer manual for details on changing the baud rate for the printer.

18. If you are using a parallel printer, plug the 15-pin connector end of the printer cable into the **PARALLEL** port at the rear of the Desktop Unit.

Plug the 36-pin connector end of the same cable into the appropriate port at the rear of the printer.

19. If you are using a serial printer, plug either of the two 25-pin connector ends of the printer cable into the **SERIAL RS232** port at the rear of the Desktop Unit.

Plug the other 25-pin connector end of the same cable into the appropriate port at the rear of the printer.

20. Refer to Section 3 for the sequence to use when powering up the system.

### **2.5.3 Installing Other 8- and 16-Bit Desktop Microcomputers**

The DBS 16 can accommodate any of the DBSI 8- or 16-bit desktop microcomputers listed in this paragraph. Although the DS 81 display terminal is standard, you can also use either a DBSI desktop microcomputer or your own display terminal. To use a microcomputer, you must first purchase a terminal emulator program from your computer dealer. This is a software interface program that makes the desktop microcomputers compatible to run on the DBS 16. You can integrate the DBS 16 system with your own terminal(s), DS 81 display terminal(s), and/or any of the following DBSI desktop microcomputers:

- Digilog System 1000 or 1016
- Digilog System 1500 or 1516

During installation, substitute any of the other terminals or microcomputers wherever a display terminal is specified. Plug the 25-pin connector end of the terminal cable (as stated in step 3 of paragraphs 2.5.1 and 2.5.2) into the appropriate port at the rear of the terminal, and then proceed with the installation. Check the applicable Terminal Guide for details.

SECTION 3  
SYSTEM POWER-UP/SHUTDOWN

**3.1 INTRODUCTION**

Section 3 explains how to power-up (turn on) and initialize the DBS 16. Paragraph 3.3 gives you step-by-step instructions for configuring the applicable operating system to the DBS 16 components you are using. Also provided are instructions to shutdown (turn off) the system at the end of the day.

**3.2 POWERING UP AND INITIALIZING THE DBS 16**

When the DBS 16 is initialized (a process also referred to as booting), the operating system displays a banner and prompt on your terminal screen. The banner and prompt indicates that the operating system was properly loaded into the computer. There are two ways to perform this type of initialization (also known as a cold boot) on the DBS 16 (refer to paragraphs 3.2.1, 3.2.2, and 3.2.3 for details):

1. By turning on the power to the display terminal and Desktop Unit, and:
  - a. If you are using the two-floppy drive model, inserting the operating system diskette into the left floppy drive.
  - b. If you are using the one-Winchester/one-floppy drive model, inserting the operating system diskette into the floppy drive and copying the operating system from the diskette onto the Winchester.

NOTE: Perform step b. only if you want to initialize from the Winchester drive. It does not apply if you want to initialize from the floppy drive.

2. By pressing the RESET switch at the rear of the Desktop Unit, after the power has been turned on and the operating system loaded.

NOTE: Make sure the operating system diskette is in the left floppy drive before pressing RESET.

Another type of initialization (known as a warm boot) is performed by pressing the CTRL and C keys simultaneously. Only the disk drive prompt appears onscreen. Paragraph 3.2.4 provides additional information on using CTRL-C.



### 3.2.1 Initializing from the Floppy Drive

After power-up, the DBS 16 must have access to a valid operating system to be initialized. The operating system is contained on diskette, and must be inserted into the left floppy drive upon powering up the system. The system, when equipped with two floppy drives, automatically initializes from the operating system diskette in the left floppy drive.

If you are using the two-floppy drive model, perform the following steps to power-up and initialize (cold boot) the DBS 16:

1. Insert the operating system diskette, applicable to the system configuration that you have installed, into the left floppy drive on the Desktop Unit.
  - a. If you have installed a single-user system, insert either the CP/M-86 or the MS-DOS operating system diskette. (MS-DOS is an optional purchase.)
  - b. If you have installed one or more (up to four) display terminals on the Desktop Unit, insert the MP/M-86 operating system diskette.
  - c. If you have installed one or more (up to 16) display terminals on the Expansion Box, insert the MP/M-86 and DBS-Net operating systems diskette.
2. Press the appropriate power switch, on the display terminal that is plugged into terminal port 1 at the rear of the Desktop Unit, to the ON position. If terminal port 1 is not used, the system is not operable.
3. Press the I/O power switch at the front of the Desktop Unit to the I (ON) position. This powers up the entire DBS 16 system (Desktop Unit, and the Expansion Box, if purchased). The power indicator at the front of the Desktop Unit will light.
4. Close the floppy drive latch. The operating system banner and disk drive prompt will appear on the display terminal screen.

See Figure 3-1, 3-2, or 3-3 for the applicable system banner that is displayed for the operating system you are using.

NOTE: The same banner and prompt are also displayed when you press the RESET switch at the rear of the Desktop Unit.

5. Refer to paragraph 3.3 for instructions on configuring the applicable operating system to the specific hardware (e.g., display terminal) that you are using.

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```
CP/M 86 Version 1.1
Segment Address = 0040
Last Offset = 3575

DBS 16 MASTER
System Generated : 02 September 1983
A = 10 Meg Winchester (1024 directory entries)
E = 48 TPI floppy

A>|
```

Figure 3-1. CP/M-86 Operating System Banner and Prompt

```
MS - DOS version 2.00
Copyright 1981,82,83 Microsoft Corp.

A>|
```

Figure 3-2. MS-DOS Operating System Banner and Prompt

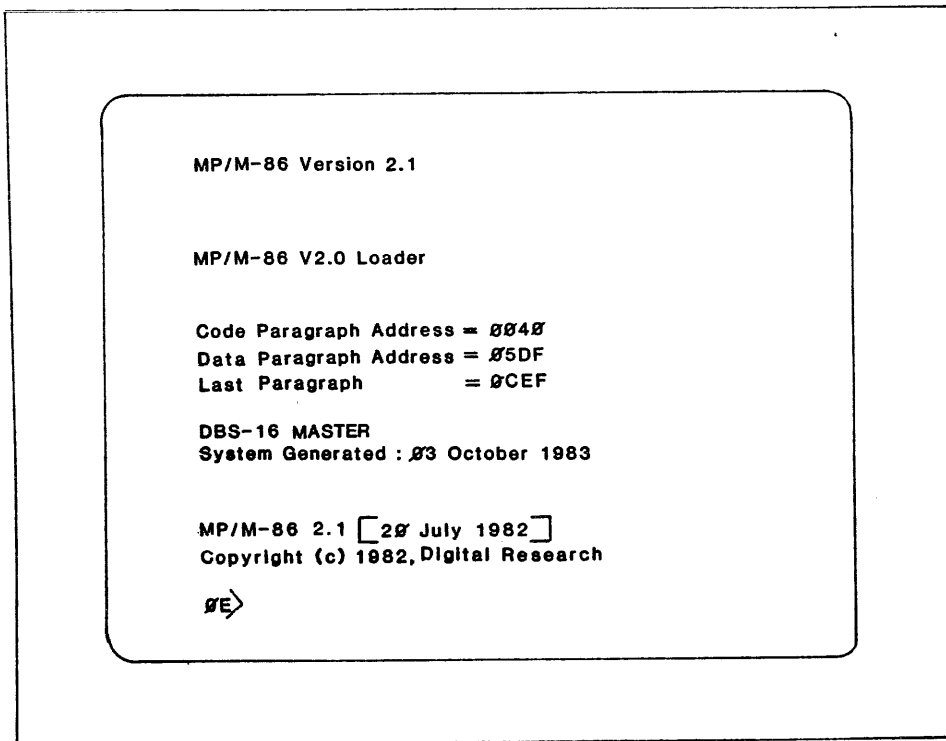


Figure 3-3. MP/M-86 Operating System Banner and Prompt

### 3.2.2 Initializing from the Winchester Drive

As stated in paragraph 3.2.1, at power-up the DBS 16 must have access to a valid operating system to be initialized. The system, even when equipped with a Winchester drive and one floppy, still initializes automatically from the operating system diskette in the left floppy drive. The Winchester drive is formatted prior to shipment, but contains no operating system.

The system can be forced to bypass the floppy drive and go to the Winchester drive for the operating system:

First, the operating system diskette must be inserted into the left floppy drive at power-up. Next, the operating system must be transferred from the diskette onto the Winchester. The system, however, will still attempt to initialize from the floppy drive. At power-up, if the operating system diskette is not in the floppy drive, the system will go to the Winchester for the operating system.

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If you are using the one-Winchester/one-floppy drive model, perform the following steps to power-up and initialize the DBS 16:

1. Insert the operating system diskette, applicable to the system configuration that you have installed, into the left floppy drive on the Desktop Unit.
  - a. If you have installed a single-user system, insert either the CP/M-86 or the MS-DOS operating system diskette. (MS-DOS is an optional purchase.)
  - b. If you have installed one or more display terminals (up to four), insert the MP/M-86 operating system diskette.
  - c. If you have installed one or more display terminals on the Expansion Box (up to 16), insert the MP/M-86 and DBS-Net operating systems diskette.
2. Press the appropriate power switch, at the rear of the display terminal that is plugged into terminal port 1 at the rear of the Desktop Unit, to the ON position. The system is not operable if terminal port 1 is not used.
3. Press the I/O power switch at the front of the Desktop Unit to the I (ON) position. This powers up the entire DBS 16 system (Desktop Unit, and Expansion Box, if purchased). The power-on indicator at the front of the Desktop Unit will light.
4. Close the floppy drive latch. The operating system banner and disk drive prompt will appear on the display terminal screen.

See Figure 3-1, 3-2, or 3-3 for the applicable system banner that is displayed for the operating system you are using.

NOTE: The same banner and prompt are also displayed when you press the RESET switch at the rear of the Desktop Unit.

5. Copy all the files on the operating system diskette onto the Winchester. Refer to the applicable system reference manual for specific instructions and command syntax.

- a. In CP/M-86, use the PIP utility.

- 1) Enter **PIP A:=F:\*.#**, if using a 96 TPI disk drive.

Enter **PIP A:=E:\*.#**, if using a 48 TPI disk drive.

This command copies all of the files (\*.#) on the diskette in drive F (or drive E) onto the Winchester drive (drive A). A and F (or E) are the default drives. Enter the actual drive designators assigned to the system you are using.

- b. In MS-DOS, use the DISKCOPY utility.

Enter **DISKCOPY** at the system prompt, and answer the questions.

- c. In MP/M-86, use the PIP utility.

(Use the same procedure outlined in subtopic a.)

**NOTE:** You must execute the **DSKRESET** command after copying files in MP/M-86. Refer to the DBS 16 MP/M-86 and DBS-Net Systems Reference Manual for details.

- d. In MP/M-86 and DBS-Net, use the PIP utility.

Same application (including NOTE) as subtopic c.

6. Run the CLOADER utility/program to create an operating system disk on the Winchester drive. This enables the system to initialize from the Winchester.

Enter **CLOADER** at the system prompt. CLOADER prompts you for the source and destination drives. The source drive is the floppy drive containing the system loader file required for system initialization. The destination drive is the Winchester drive to which the file is to be copied. Refer to any of the three DBS 16 System Reference manuals that apply to the operating system you are using, for detailed instructions on running the CLOADER utility/program.

7. Refer to paragraph 3.3 for instructions on configuring the applicable operating system for the specific hardware (e.g., display terminal) that you are using.

### 3.2.3 Initializing with the RESET Switch

You can also initialize the DBS 16 by pressing the RESET switch at the rear of the Desktop Unit. This type of initialization can be performed only after the system is powered up and the operating system is loaded. The RESET switch initializes the system and redisplay the operating system banner and prompt that appeared at power-up.

There are several reasons for using the RESET switch:

1. If there has been a power failure.
2. If an application program gets hung up (is in a loop).
3. If you want to restart the system.
4. If the wrong diskette (one that does not contain the operating system) was inserted for power-up.

Remove the diskette, insert the operating system diskette and press the RESET switch.

### 3.2.4 Initializing with CTRL-C

This type of initialization is normally performed after changing diskettes, at any time during operations. In CP/M-86, pressing CTRL-C causes the operating system to recognize that a different diskette was inserted in the drive. In MP/M-86, executing DSKRESET performs the same function.

CTRL-C can also be used to abort or exit an operation during program execution. For instance, you might want to exit the CSYS16 configuration program before answering all the questions.

After you press the CTRL and C keys simultaneously, the default drive prompt will appear onscreen. The default drive is the drive on which the system was initialized.

## 3.3 CONFIGURING THE OPERATING SYSTEM TO THE DBS 16

CSYS16 is the special configuration program that the operating system uses to determine the type of system you have installed. This program is invoked automatically the very first time that you power-up the DBS 16. It prompts you for the information required to customize the operating system to the equipment you will use.

If, in the future, you install additional equipment (such as display terminals), or change the existing equipment (i.e., increasing storage capacity), you must rerun this program to reflect all changes as they are made. The program displays the following message when it is invoked:

**System Customization Utility ver 1.0, 6-Sept-83**

Answer each question by entering the correct letter next to the appropriate selection provided, as it applies to your system. Press CTRL-C to exit or abort the program (before completion). The following message will appear onscreen if you enter an incorrect letter selection:

**That response is not supported, please re-enter**

Proceed accordingly.

(Throughout Section 3, text highlighted in bold type represents the program as it appears onscreen.)

If this is the first time you are powering up the system, you will not have to enter **CSYS16** at the system prompt. The program is already invoked and waiting for your input to the first question.

Upon completion of the configuration procedure, the system prompt is displayed, and the operating system is ready for operation.

The CSYS16 program is also described in the DBS 16 CP/M-86 System Reference Manual and the DBS 16 MP/M-86 and DBS-Net Systems Reference Manual.

1. Enter **CSYS16** at the system prompt, and press the Return key. The following is displayed:

**Operating system type to be customized:**

- (A). CP/M-86
- (B). MP/M-86

**Enter the letter that corresponds to the type of operating system you would like to setup:**

2. After you select the operating system, the following is displayed:

**Disk drive types:**

- (A). DUAL FLOPPY DRIVE SYSTEM
- (B). FLOPPY DRIVE AND WINCHESTER DRIVE SYSTEM

**Enter the letter that corresponds to your type of system:**

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3. If you selected A, the following display appears. Go to step 6 after making your selection. If you selected B, go to step 4.

**Floppy drive system types:**

- (A). DUAL 48 TPI DRIVES
- (B). DUAL 96 TPI DRIVES

**Enter the letter that corresponds to the type of your floppy drive system:**

4. If you selected B in step 2, the following is displayed:

**Floppy drive + winchester combination types:**

- (A). 48 TPI + WINCHESTER
- (B). 96 TPI + WINCHESTER

**Enter the letter that corresponds to your system drive combination:**

5. After you select the disk drive combination, the following is displayed:

**Winchester storage capacity options:**

- (A). 5 MEGABYTES
- (B). 10 MEGABYTES
- (C). 15 MEGABYTES

**Enter the letter that corresponds to the maximum storage of your Winchester:**

NOTE: Future increases in storage capacity will be identified here.

6. After you select the disk drive type and, if applicable, the storage capacity, the following is displayed:

**Types of terminal models:**

- (A). DS 81
- (B). ADM 3A

**Enter the letter that corresponds to your terminal type:**



7. After you select the terminal model, the following is displayed:

**Character length:**

- (A). 5 BITS
- (B). 6 BITS
- (C). 7 BITS (standard choice)
- (D). 8 BITS

**Enter the letter that corresponds to the number of data bits being sent between the terminal and computer:**

8. After you select the character length, the following is displayed:

**Types of parity:**

- (A). ODD
- (B). EVEN (standard choice)
- (C). NONE

**Enter the letter that corresponds to the type of parity being used:**

9. After you select the parity type, the following is displayed:

**Baud rates:**

- (A). 110 BAUD
- (B). 300 BAUD
- (C). 600 BAUD
- (D). 1200 BAUD
- (E). 2400 BAUD
- (F). 4800 BAUD
- (G). 9600 BAUD (standard choice)

**Enter the letter that corresponds to the baud rate being used in this terminal:**

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10. After you select the baud rate, the following is displayed:

**Selected terminal characteristics**

- (A). **Operating system** : (The selections you entered  
(B). **Type of terminal** : are displayed after the  
(C). **Disk drive types** : colon.)  
(D). **Character length** :  
(E). **Parity** :  
(F). **Baud rate** :

**Are these entries correct? Y/N**

11. If any of your selections are incorrect, and you answer **N**, the following message will be displayed:

**Enter the letter that corresponds to the parameter  
you would like to change:**

12. The parameter that you enter is displayed. Enter your change(s). The summary listing in step 10 will be displayed again after you make your entry(ies).
13. When the parameters are correct, enter **Y** in step 10 to exit the program. The system prompt will reappear after you complete the configuration procedure.

### **3.4 FAILURE UPON POWER-UP**

At power-up, if the operating system banner did not appear onscreen, or the power indicator on the front of the Desktop Unit did not light, refer to paragraph 5.3, Troubleshooting Power-Up Failure, for help in identifying and correcting the problem. After correcting the problem, return to paragraph 3.2, and resume the power-up sequence.

### **3.5 SHUTTING DOWN THE DBS 16**

You can perform the following procedure any time that daily operations have been completed, or for normal end-of-day system shutdown.

1. Properly close out the current operation.

NOTE: When operating under MP/M-86, execute the DSKRESET command before shutting down the system. This ensures that all files are closed (i.e., a program or operation is not in progress) before the system is shut down.

Before continuing, make sure the disk drive prompt appears onscreen.

CAUTION

NEVER REMOVE A DISKETTE FROM THE FLOPPY DRIVE WHEN THE DRIVE LIGHT IS ON, AND NEVER TURN OFF THE POWER TO THE DESKTOP UNIT WHEN THE FLOPPY OR WINCHESTER DRIVE LIGHT IS LIT. LOSS OF DATA STORED ON EITHER THE DISKETTE OR WINCHESTER DISK (DEPENDING ON WHICH IS IN USE) CAN RESULT.

2. If you are using the floppy drive(s), open the drive latch(es) and remove the diskette(s).
3. Press the appropriate power switch on the display terminal(s), to the OFF position.
4. Press the I/O switch, at the front of the Desktop Unit, to the 0 (OFF) position.

SECTION 4  
SYSTEM OPERATION

**4.1 INTRODUCTION**

Section 4 provides additional information on the floppy and Winchester disk drives. Paragraph 4.3.1 contains instructions for handling and protecting diskettes. Various system functions (such as diskette formatting) are also explained. Reference is also made to the DBS 16 System Reference manual that is applicable to the operating system you are using. Refer to the appropriate manual for details on all of the operating system utilities (commands).

**4.2 DISK DRIVES**

As stated in paragraph 1.3.2, the DBS 16 system contains two disk drives: either two floppies, or a Winchester and floppy. The floppies can be either 48 or 96 tracks per inch (TPI) drives.

A 48 TPI drive uses a diskette formatted at 48 TPI for copying, deleting, displaying, or editing the contents of a file, as well as for various other functions. A diskette formatted at 96 TPI cannot be used on a 48 TPI disk drive.

A diskette formatted at 48 or 96 TPI can be read from on a 96 TPI disk drive (drive E). However, only diskettes formatted at 96 TPI can be written to on a 96 TPI drive.

There is a red light on the front of each disk drive, whether floppy or Winchester. When it is lit, it indicates that the drive is currently in operation.

**CAUTION**

NEVER REMOVE A DISKETTE FROM THE FLOPPY DRIVE WHEN THE DRIVE LIGHT IS ON, AND NEVER TURN OFF THE POWER ON THE DESKTOP UNIT WHEN THE FLOPPY OR WINCHESTER DRIVE LIGHT IS LIT. LOSS OF DATA STORED ON EITHER THE DISKETTE OR WINCHESTER DISK (DEPENDING ON WHICH IS IN USE) CAN RESULT.

### 4.3 THE FLOPPY DISK

The floppy disk drive accepts 5-1/4 inch, double-density, double-sided diskettes. There is a special command to format a diskette for either a 48 or 96 TPI disk drive. It divides the diskette into the specified number of tracks for that particular drive. You must format all new floppy disks before attempting to use them. Refer to paragraph 4.3.5 for a brief explanation, and to the DBS 16 System Reference manual that applies to the operating system you are using, for detailed information on the command used for formatting diskettes.

#### 4.3.1 Handling Floppy Disks

Proper diskette handling is essential to the successful execution of system functions. A diskette is easily damaged by scratches, fingerprints, magnetic fields, or liquids. You cannot use a damaged diskette because the disk contents will be unrecognizable to the system, and therefore, cannot be read.

Each diskette is packaged in a protective envelope or paper jacket. DO NOT discard this envelope! It is the best storage facility for the diskette.

Several precautionary measures must be taken to prolong diskette life, and to protect the data stored on it:

1. Handle a diskette gently; touch only the edges or corners so as not to damage the magnetic surface.
2. Store the diskette in its protective envelope and a storage container when not in use.
3. NEVER attempt to remove the black plastic jacket covering the diskette. It contains cleaning agents and lubricants that help to prolong diskette life.
4. NEVER use paperclips or staples to attach anything to a diskette.
5. NEVER use a pencil or ballpoint pen to write on a label affixed to a diskette; you can pierce or bend the diskette. It is recommended that you use a felt-tip pen, pressing lightly; or write on the label before affixing it to the diskette.
6. Do not eat, drink, or smoke when handling a diskette. Spillage will damage the magnetic surface.

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7. Do not expose a diskette to magnetic fields, such as those emitted by office copy machines, magnetic paper clip dispensers, or typewriters. The data stored on the disk might be erased.
8. Do not expose the diskette to heat sources, such as windows, direct sunlight, or radiators. Maintain temperatures in your work area between 50° and 95° Fahrenheit (10° to 35° Celsius). Otherwise, the diskette can warp, making the contents irretrievable.
9. Do not remove a diskette from the floppy drive when the drive light is lit.
10. Do not turn off the power to the Desktop Unit when a diskette is in the floppy drive and the drive latch is closed. Always open the latch before shutting down your system. Otherwise, the data on the diskette may be lost.

**4.3.2 Preserving the Contents of Floppy Disks: Write-Protect Tabs**

Proper daily use and care of your diskettes is important to ensure protection of the data stored on the diskette.

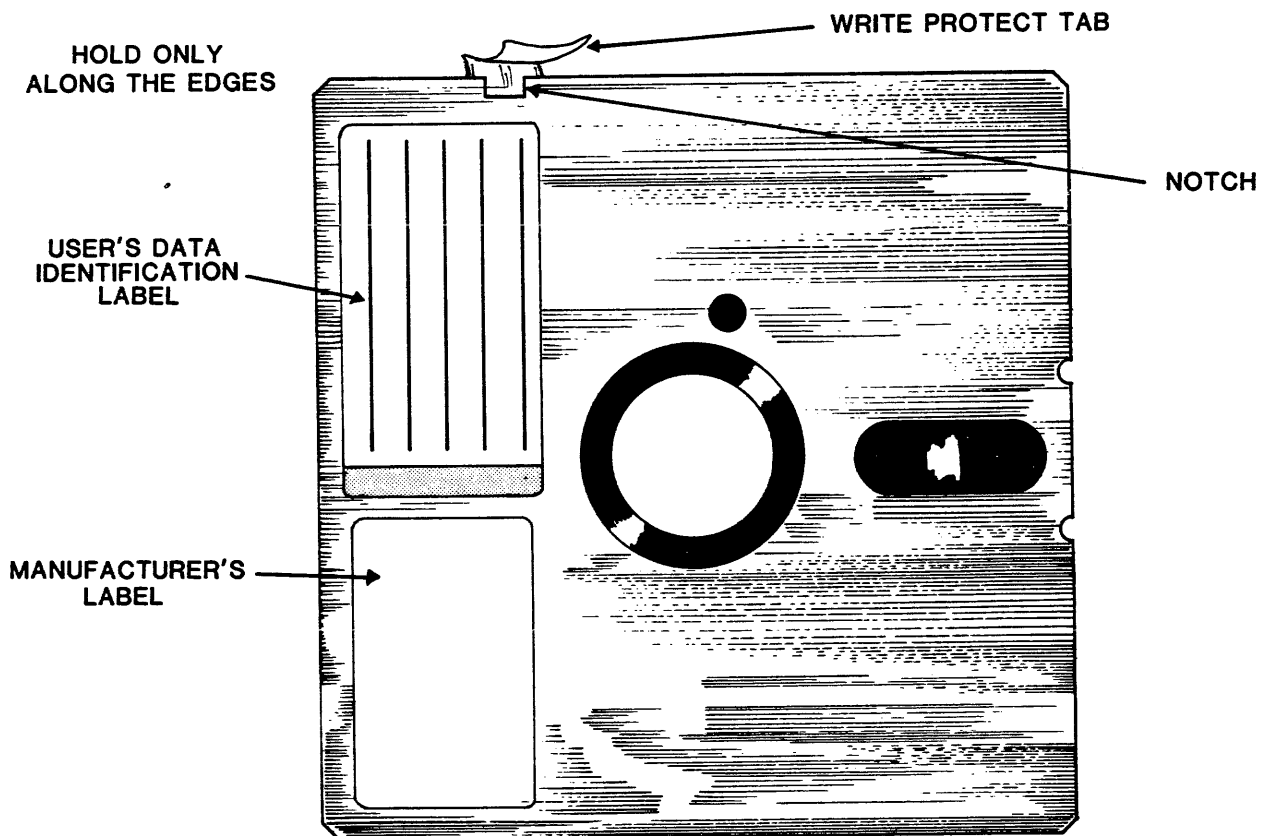


Figure 4-1. A Floppy Disk with Write-Protect Tab

Write-protect tabs are provided with the diskettes. These tabs are similar to peel-off labels; the sticky side allows for easy placement, and removal if necessary. A tab placed over the notch on the edge of a floppy disk prevents accidental erasure or write-over of the contents of the diskette. A diskette with a write-protect tab can only be used for reading data (Read Only - RO).

To apply a write-protect tab on a diskette, peel the tab off its backing, and place it over the notch on the edge of the diskette. See Figure 4-1 for a representation of a diskette with a write-protect tab. To remove a tab from a disk, simply peel it off. The tab is reusable; you do not have to discard it after removal.

#### 4.3.3 Labelling Floppy Disks

It is recommended that you label each diskette with information that is relevant to the data stored on it. The information can be a list of filenames, a general statement of subject matter, or any other type of description that identifies the contents of the diskette.

Be sure to use a soft felt-tip pen if you write on a label after it is placed on a diskette. Otherwise, you can damage the diskette.

#### 4.3.4 Inserting and Removing Floppy Disks

A diskette must be properly seated in the floppy disk drive to function. The following steps explain how to insert a diskette correctly:

1. If applicable, place a write-protect tab over the notch of your diskette.
2. Open the floppy disk drive latch (see Figure 4-2).
3. Hold the diskette with the notch facing upward (see Figure 4-1). Carefully slide the diskette into the drive until it stops.
4. Close the drive latch. If you feel any resistance, the diskette is not correctly seated in the drive. Remove the diskette and reinsert it.

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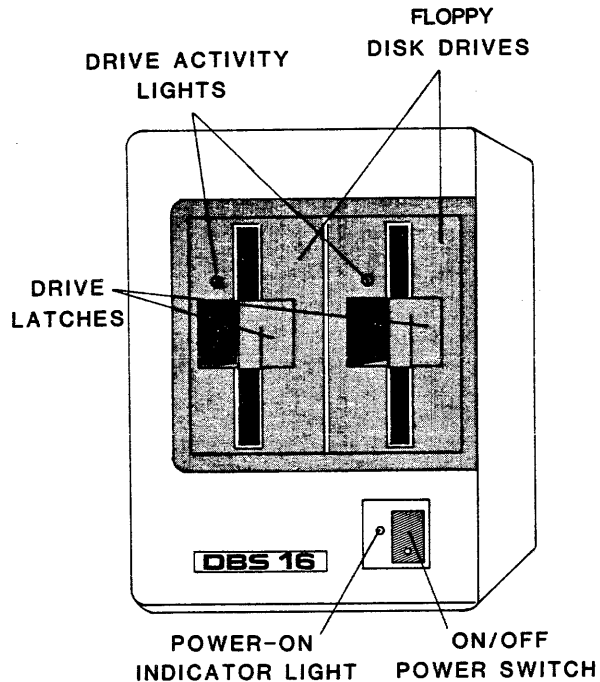


Figure 4-2. Floppy Disk Drive: Representative Illustration

Always wait until the floppy disk drive light is off before removing the diskette. If you want to insert another diskette after removing one, do the following:

1. Wait until the disk drive light is off, then open the disk drive latch and remove the diskette.
2. Insert the new diskette into the disk drive, and close the drive latch.
3. Press the CTRL and C (CTRL-C) keys simultaneously, and wait for the system prompt (applicable to the operating system you are using) to appear onscreen.

NOTE

You must press CTRL-C each time you change diskettes, while working with an operating system such as CP/M-86. This resets the drive heads and diskettes. Otherwise, a read error will result. Press CTRL-C twice to correct the error. Refer to the DBS 16 System Reference manual that applies to the operating system you are using, for details on the specific error generated and the command used to change diskettes.

In MP/M-86, execute the DSKRESET command to perform the same function as pressing CTRL-C in CP/M-86.



#### 4.3.5 Preparing Floppy Disks for Operation

As stated in paragraph 4.3, new diskettes must be properly formatted to run on a DBS 16 floppy disk drive. This paragraph briefly explains the procedure for preparing a diskette for such uses as copying files from one diskette to another. Refer to the DBS 16 System Reference manual that explains the operating system that you are using, for the specific command to format a diskette.

1. All diskettes fresh out of the box must be formatted for use on the type of disk drive you are using.

2. To format a diskette on a two-floppy drive system:

First, insert the operating system diskette into the left floppy drive. Then, insert the new diskette into the right floppy drive.

3. To format a diskette on a one-Winchester/one-floppy drive system:

NOTE: The Winchester must be formatted before copying the operating system diskette. Refer to the applicable system reference manual for details.

Copy the operating system onto the Winchester disk. First, insert the operating system diskette into the left floppy drive. After copying the operating system to the Winchester, remove the operating system diskette from the left floppy drive and insert a new diskette to format.

4. Enter the applicable format command for the operating system you are using, to format the new diskette.
5. If the disk drive is a 48 TPI drive, the diskette will be formatted as such.
6. If the disk drive is a 96 TPI drive, the diskette will be formatted as such.
7. If a diskette was previously formatted for the type of drive you are using, there is no need to reformat it. If you want to write to the diskette, just make sure the number of tracks per inch is compatible with your drive.
8. If a diskette was previously formatted for a different type of drive, you must reformat it.

#### 4.3.6 Master and Backup Floppy Disks

It is good practice to create a backup (second) copy of a master (original) diskette. This prevents loss of data if the original diskette is damaged or lost. This can be done on a daily basis by using the applicable copy command in the operating system that you are using. Refer to the DBS 16 System Reference manual that applies, for operating details.

#### 4.4 OPERATOR MAINTENANCE

Operator maintenance consists mainly of periodically cleaning the system components. This preserves the original appearance of the system, and ensures its continuing reliability.

Refer to paragraph 4.3.1 for information on the care and maintenance of diskettes. Any other required maintenance or repairs must be performed by a qualified technician. Contact your service organization, if necessary. Follow these instructions to properly and safely clean the display terminal, Desktop Unit, and Expansion Box:

1. Turn the ON/OFF power switch at the front of the Desktop Unit to the off position.
2. Turn the appropriate power switch on the display terminal to the off position.
3. Unplug the power cords to both units from the wall outlets.

**\* WARNING \***

DO NOT PROCEED BEFORE YOU MAKE SURE THAT POWER IS OFF IN THE DISPLAY TERMINAL AND THE DESKTOP UNIT, AND THAT BOTH POWER CORDS ARE UNPLUGGED. THIS MUST BE DONE IN ORDER TO AVOID THE POSSIBILITY OF ELECTRICAL SHOCK.

4. Use a damp, lintless cloth and a mild household detergent or alcohol to clean the CRT screen and the enclosures of the terminal, Desktop Unit, and Expansion Box.

NOTE: Make sure the cloth is well wrung out to prevent water from seeping into the seams of the enclosures.

5. Use a small, dry, soft bristle brush to clean the keyboard.

6. When you have finished:
  - a. Make sure the power to all components is still off.
  - b. Plug the power cords of the terminal(s) and the Desktop Unit into three-prong wall outlets.
  - c. Turn on the power to both units, and proceed with desired operations.

SECTION 5  
SYSTEM CHECK

**5.1 INTRODUCTION**

Section 5 provides instructions for troubleshooting the system in the event of a power failure, system fault, or any other functional problem occurring during daily operations. Included are a flowchart and table to assist you in isolating the cause of the problem.

**5.2 ADDITIONAL SOURCES FOR PROBLEM RESOLUTION**

Systematically checking specific items on the DBS 16 will usually identify why the system failed to power-up, or why a functional problem occurred. The information in this section should enable you to resolve many system operating problems, without having to contact your service organization. If more information is needed to correct the problem, refer to any of the following sources:

1. CP/M-86 User's Manual

(There are numerous commercially available CP/M manuals and handbooks.)

2. DBS 16 CP/M-86 System Reference Manual

3. DBS 16 MP/M-86 and DBS-Net Systems Reference Manual

4. DBS 16 Hardware Description and Maintenance Manual

5. The user's or diagnostics manuals for each peripheral device used in your expanded system.

6. Your computer dealer or service technician.

**5.3 TROUBLESHOOTING POWER-UP FAILURE**

If the DBS 16 fails to power-up at any time, there are a few items you should check before contacting your computer dealer or service organization. The flowchart in Figure 5-1 is provided as a quick step-by-step guide for isolating the problem. It summarizes the following procedure, which checks specific items on the DBS 16 to ensure that it is powered-up.

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1. Make sure the display terminal and Desktop Unit are powered-up. Listen for the fan on the Desktop Unit.
  - a. If it is on, proceed to step 7.
  - b. If it is off, proceed to step 2.
2. Check that the power cords for the display terminal and the Desktop Unit are connected at the rear of both units, and are plugged into a good three-prong wall outlet that has been properly grounded.
  - a. If they are plugged in, proceed to step 3.
  - b. If they are not, plug them in and return to step 1.
3. Check for power in the wall outlet.
  - a. If there is power, proceed to step 6.
  - b. If there is no power, check to see if the outlet is controlled by a wall switch.
    - 1) If it is, check to see if the switch is off.
      - a) If it is off, turn it on and return to step 1.
      - b) If it is on, proceed to step 4.
    - 2) If it is not controlled by a wall switch, proceed to step 4.
4. Check the appropriate circuit breaker to ensure the circuit serving the DBS 16 system is not overloaded.
  - a. If it is tripped, adjust it and return to step 1.
  - b. If it is not tripped, call power service.
5. Check the cable connections between the Desktop Unit and the display terminal. Make sure the cable is connected to terminal port 1 at the rear of the Desktop Unit and the appropriate port at the rear of the terminal.

NOTE: The system is not operable if terminal port 1 is not used.

- a. If both ends of the cable are connected, proceed to step 8.
- b. If neither end is connected, connect the appropriate end(s) and return to step 1.

DBS 16 USER'S MANUAL  
SYSTEM CHECK

6. Check, in any order, the fuse at the rear of the display terminal, and the fuse at the rear of the Desktop Unit. Refer to paragraph 5.3.1 for instructions on replacing fuses. After replacing the fuse(s), proceed to step 7.
7. Check that the cursor appears on the display terminal screen.
  - a. If it appears, proceed to step 8.
  - b. If it does not appear, adjust the brightness control knob on the display terminal.

If the cursor still does not appear onscreen, refer to the appropriate terminal guide for your terminal for troubleshooting instructions. Then, proceed to step 8.

8. Check that the operating system banner is also displayed on the terminal screen.
  - a. If it is, the system has successfully powered up. Proceed with desired operation.
  - b. If it is not, check that an operating system diskette was inserted in the correct floppy drive.
    - 1) If it is in the drive, remove it and insert another operating system diskette. Then press the RESET switch at the rear of the Desktop Unit.
      - a) If the operating system banner appears onscreen, the system has successfully powered up. Proceed with desired operation.
      - b) If the operating system banner does not appear onscreen, contact your service organization.
    - 2) If is not in the drive, insert an operating system diskette and press the RESET switch at the rear of the Desktop Unit. Continue at step 8.b.1)a).

9. Repeat step 1.
  - a. If the problem persists, or if a second fuse blows, contact your service organization.
  - b. If the system powers up, proceed with desired operation.

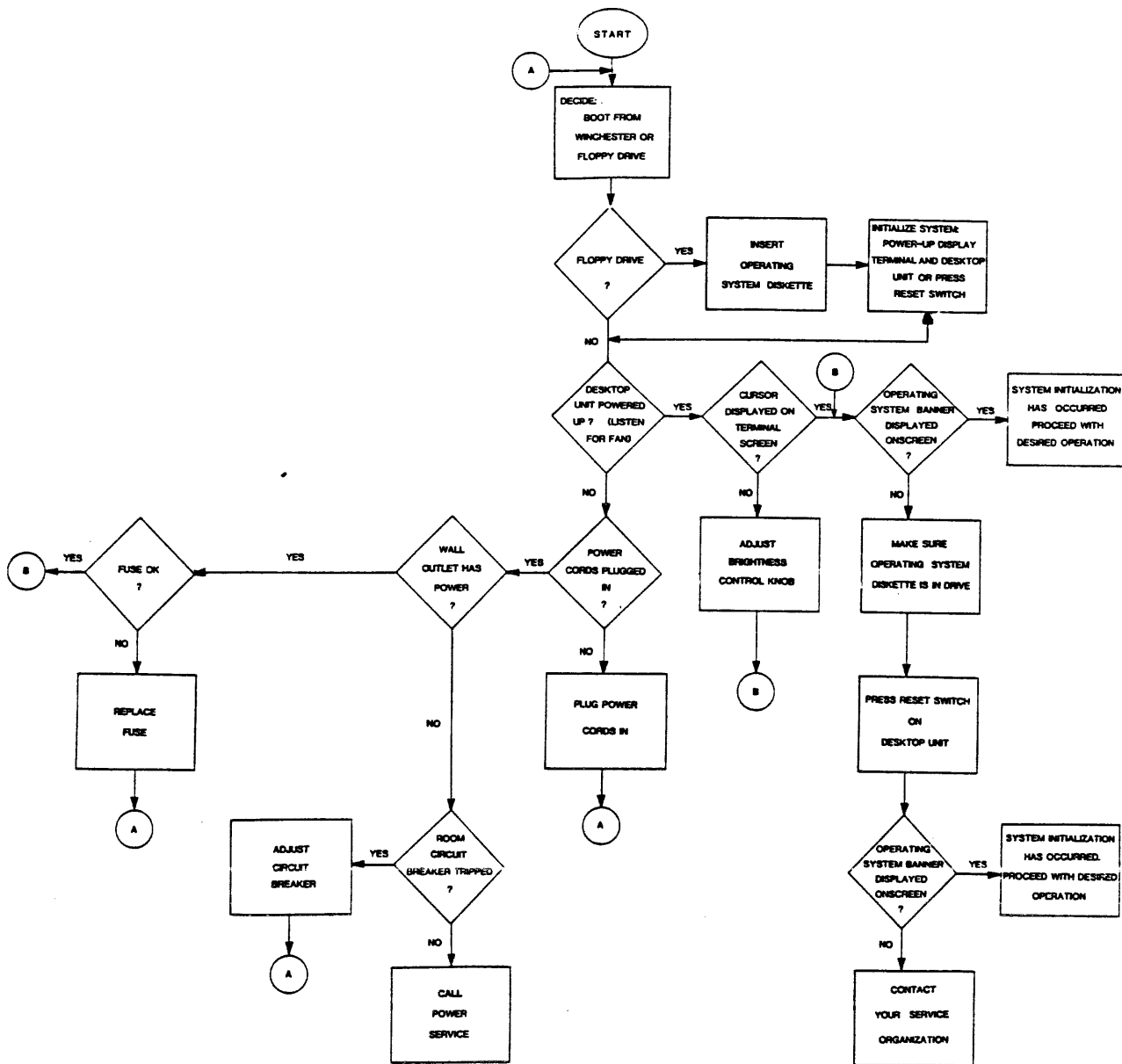


Figure 5-1. Troubleshooting Power-Up Failure Flowchart

DBS 16 USER'S MANUAL  
SYSTEM CHECK

### 5.3.1 Installing or Replacing Fuses

Perform the following steps to either install or replace a fuse for the DBS 16. The procedure is the same for changing a fuse on the display terminal or the Desktop Unit.

**\* WARNING \***

TURN OFF POWER TO THE SYSTEM BEFORE ATTEMPTING TO CHANGE FUSES. OTHERWISE, AN ELECTRICAL SHOCK COULD RESULT.

1. Make sure the on/off power switch on both units is in the OFF position.
2. Unplug the power cord of the applicable unit from the wall outlet.
3. Locate the fuseholder at the rear of the unit. To remove the fuseholder, simultaneously push it in and turn it counterclockwise.

If the fuseholder contains a bad fuse, simply pull the fuse out of its holder. Then proceed to step 4.

**NOTE**

You may not be visually able to detect if the fuse is good or bad. If in doubt, change the fuse anyway.

4. Insert the new fuse into the fuseholder (refer to the Line Voltage Setting Chart in paragraph 2.3.2 to select the right type of fuse).
5. To reinsert the fuseholder, simultaneously push it in and turn clockwise.
6. Check that the on/off power switch on the unit is still in the OFF position. Then plug the unit power cord into a three-prong wall outlet.
7. Turn the on/off power switch on the unit to the ON position. Then proceed with desired operations.

**NOTE**

If a fuse blows twice in succession, do not replace it a second time. Contact your service organization.



#### **5.4 TROUBLESHOOTING OTHER FUNCTIONAL PROBLEMS**

If a functional problem, such as a disk drive malfunction, occurs during system operation, use the following Troubleshooting Checklist before contacting your service organization. The checklist outlines some of the problems that can occur after the system is powered up. Also included in the list are probable causes for the problems, and solutions. Contact your service organization for those problems not referenced here.

Table 5-1. Troubleshooting Checklist

PROBLEM	CAUSE	CORRECTION
DBS 16 powered up, no image or cursor shows onscreen	Brightness Control Knob may not be properly adjusted	Adjust Brightness Control Knob
DBS 16 powered up, functioning okay, but still no image or cursor onscreen	Display terminal is malfunctioning	Refer to the troubleshooting guide for the display terminal
DBS 16 cannot boot from floppy drive	No diskette in drive  Diskette was not inserted properly in the drive  Drive latch is not closed  Defective or wrong diskette being used  Drive not properly powered up	Insert a diskette  Reinsert diskette (refer to Section 4 for instruction)  Close drive latch  Replace diskette  Power-up system (refer to Section 4)
DBS 16 cannot boot from Winchester drive	Winchester drive is malfunctioning  Operating system is not on Winchester drive	Contact service organization  Boot from floppy drive
Cannot write to diskette	Using a 48 TPI unformatted diskette on a 96 TPI drive  Using an incorrectly formatted 96 TPI diskette  Write-protect tab is on diskette	Not allowed  Reformat diskette  Remove write-protect tab
Printer does not work	-----	Check: <ul style="list-style-type: none"> <li>• Cable connection</li> <li>• If system is configured for this printer (refer to sources in paragraph 5.2)</li> </ul>

**DBS 16 USER'S MANUAL**

**APPENDIX A**

**DBS 16 SYSTEM SPECIFICATIONS**

**Table A-1. DBS 16 SYSTEM SPECIFICATIONS (Part 1 of 3)**

DESKTOP UNIT

PHYSICAL CHARACTERISTICS	Width: 9-1/8 inches Height: 12 inches Depth: 15 inches Weight: Approx. 30 lbs., depending on drives
POWER	Voltage: 120 V/240 V Frequency: 60 Hz/50 Hz Consumption: Approx. 120 W
SOFTWARE	CP/M-86, MS-DOS (single users) MP/M-86 (1-4 users) MP/M-86 and DBS-Net (1-16 users) Assembly Language: 80186
MICROPROCESSOR	Type: 80186 Word Size: 16 bits Speed: 8 MHz
MEMORY	Type: Dynamic RAM Size: 256K bytes standard (additional 256K bytes optional)
MASS STORAGE	Type: 5-1/4 inch Winchester hard disk Number of Drives: 1 as option Data Format: Soft sector Data Area: 5M, 10M, or 15M bytes (others to be announced) Transfer Rate: 5M bits/second
BACKUP STORAGE	Type: 5-1/4 inch floppy disk drive Number of Drives: 1 or 2 Data Format: Soft sector Data Area: 780K for 96 TPI 330K for 48 TPI Transfer Rate: 250K bits/second
PARALLEL PRINTER	Type: 8-bit Transmission Speed: Greater than 2000 cps

DBS 16 USER S MANUAL  
 APPENDIX A. DBS 16 SYSTEM SPECIFICATIONS

**Table A-1. DBS 16 SYSTEM SPECIFICATIONS (Part 2 of 3)**

INTERFACE	Printers Supported:	Centronics-compatible, NEC, Okidata, etc.
SERIAL INTERFACE	Type:	RS-232C/CCITT V.24
	Mode:	Asynchronous/Synchronous
	Transmission Speed:	Up to 19,200 baud
	Printers Supported:	Serial RS-232C compatible
DISPLAY TERMINAL INTERFACE	Type:	SDL serial ports
	Number:	4
	Mode:	Asynchronous
	Transmission Speed:	Up to 9600 baud

EXPANSION BOX

PHYSICAL CHARACTERISTICS	Width:	9-1/8 inches
	Height:	12 inches
	Depth:	15 inches
	Weight:	Dependent on number of Slave CPU or multibus boards
POWER	Voltage:	120 V/240 V
	Frequency:	60 Hz/50 Hz
	Consumption:	Less than 150 W
INTERFACE	Type:	Multibus standard 86-pin
	Capacity:	6 slots
MEMORY	Type:	Static RAM
	Size:	4K bytes
DC POWER AVAILABLE	Power:	130 W maximum +5 V at 15 A +12 V at 5.5 A -12 V at .7 A

Table A-1. DBS 16 SYSTEM SPECIFICATIONS (Part 3 of 3)

SLAVE CPU BOARD

SYSTEM INTERFACE	Type: Multibus standard 86-pin
MICROPROCESSOR	Type: 80186 Word Size: 16 bits Speed: 8 MHz
MEMORY	Type: Dynamic RAM Size: 256K bytes standard (additional 256K bytes optional)
DISPLAY TERMINAL INTERFACE	Type: SDL serial ports Number: 4 Mode: Asynchronous Transmission Speed: Up to 19,200 baud
POWER REQUIRED	Approximately +5 V at 2 A +12 V at 50 mA -12 V at 50 mA

NOTE: As many as six Slave CPU boards can be installed in the Expansion Box.

**DBS 16 USER'S MANUAL**

**APPENDIX B  
DS 81 DISPLAY TERMINAL GUIDE**

## B.1 INTRODUCTION

Appendix B provides detailed information on the DS 81 Video Display Terminal. It describes the features and functionality of the display terminal and the keyboard. Also included are instructions for installing the DS 81 VDT on the DBS 16, as well as detailed operational information.

## B.2 PHYSICAL DESCRIPTION

The DS 81 Video Display Terminal (VDT) provides local data entry and display capabilities for the DBS 16. The VDT consists of a pedestal-mounted display terminal and a detachable keyboard (see Figure B-1).

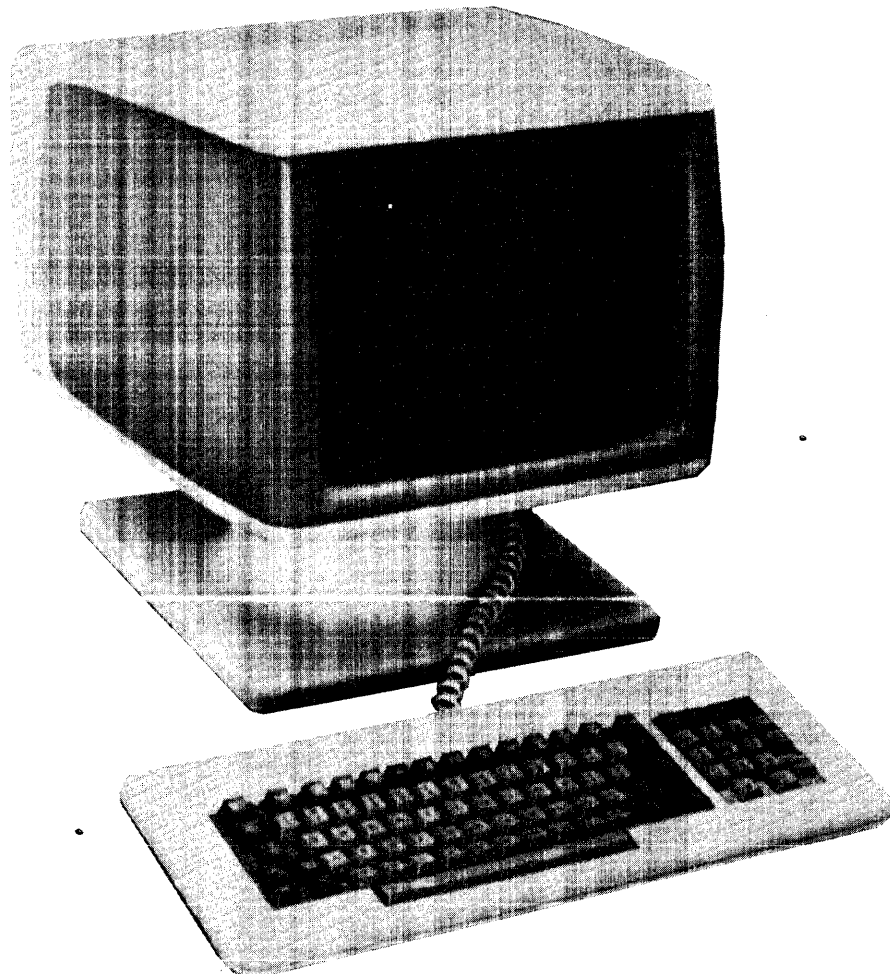


Figure B-1. DS 81 Video Display Terminal



### B.2.1 Display Terminal

The display terminal has a 14-inch diagonal green phosphor CRT, covered with a non-glare screen that reduces operator eye fatigue or discomfort. The 30-degree tilt, 360-degree swivel VDT (see Figure B-2), and the full reverse display feature (displays black characters on a green background) provide optimal screen visibility. The VDT displays a maximum twenty-four 80-character lines, and a 25th line containing terminal status information. There is also a control to regulate scrolling at either of two speeds: fast or slow-smooth.

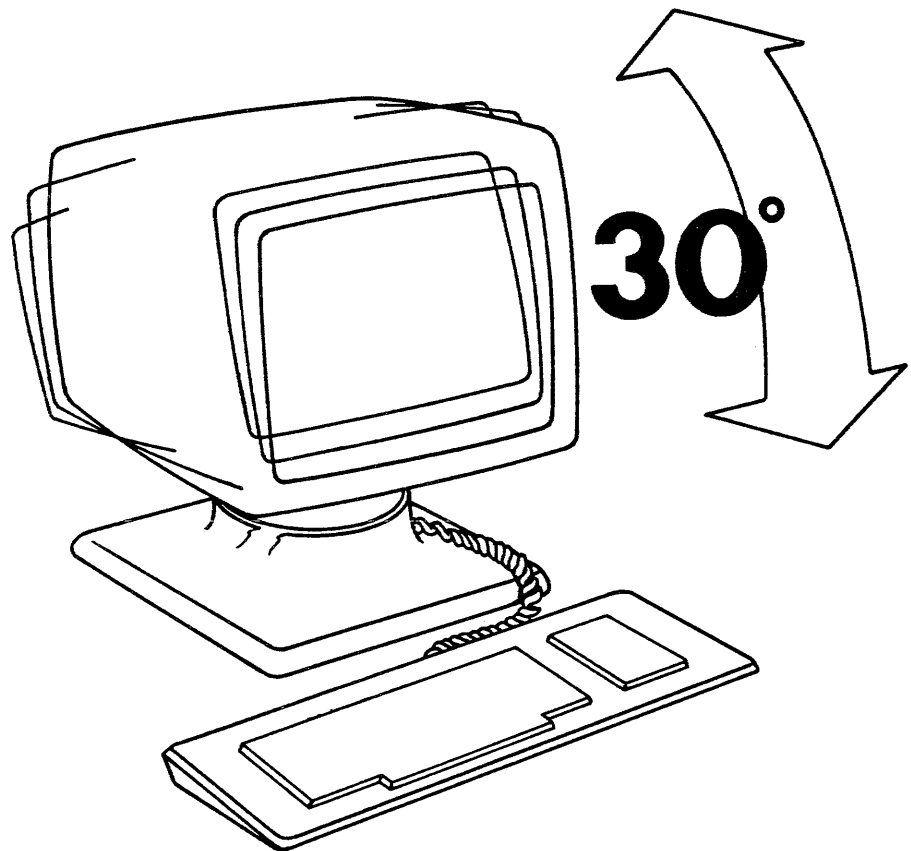


Figure B-2. DS 81 Display Terminal: Tilt and Swivel Features

### The Cursor

The cursor is a small, blinking or non-blinking indicator, displayed on the screen as a block or underline. It can also be turned off. As you enter data via the keyboard, the cursor indicates where the next character will appear, and moves automatically across the screen.

To move the cursor without entering data, press the key on the function keypad specially programmed for cursor movement. Refer to the system reference manual applicable to the operating system you are using, for details.

### Brightness Intensity

There is a brightness or contrast control located on the backpanel of the terminal marked 'CONTRAST' (Figure B-4). This control lightens or darkens the contrast of the characters against the background of the screen.

### B.2.2 Keyboard

This is a detachable, typewriter-style keyboard consisting of 48 alphanumeric keys, as well as various function keys and a 14-key calculator-style programmable keypad (see Figure B-3). The low-profile design of the keyboard helps to reduce arm and wrist strain. A coiled cable connects the keyboard to the display terminal, enabling you to place it in the most convenient operating position.

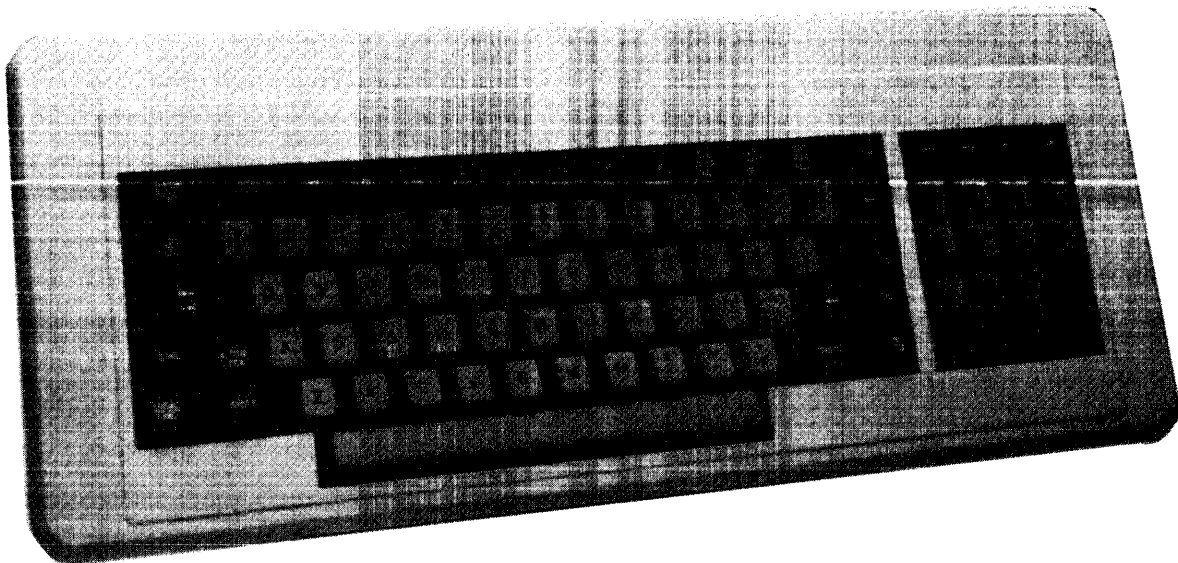


Figure B-3. DS 81 Keyboard

It is through the keyboard that you enter data and commands for performing certain operations, such as creating a file, editing existing files, or executing a program.

## **Key Functions**

The keyboard and keypad have several keys that are not found on a standard typewriter keyboard (see Figure B-3). Some of the keys have specific functions; the remaining keys are programmable.

The keys are described here as viewed in a clockwise direction, starting at the bottom left-hand corner of the keyboard. For two-command keys, simultaneously press the SHIFT key and the command key to activate the top command (uppercase).

### **1. LOCAL/LINE Key**

In uppercase, this key (LOCAL) disconnects the VDT from the DBS 16 computer, and places it in Local mode. In this mode, the computer does not accept or recognize any data entered from the keyboard. The data you enter is only displayed on the VDT screen. It is not sent to the computer.

In lowercase, this key (LINE) switches from Local mode to Line mode. In this mode, the VDT is placed online with the DBS 16 computer. The data you enter via the keyboard is sent to the computer.

### **2. SHIFT Key**

This key functions like the Shift key on a standard typewriter. However, when used in conjunction with a command key on the keyboard, it changes the command function; i.e., when used with the LOCAL/LINE key.

### **3. CTRL Key**

This command key is used in conjunction with other ASCII characters to perform specific functions on the display terminal. For example, pressing the CTRL and M keys simultaneously will execute an automatic carriage return.

### **4. ALPHA LOCK Key**

This key functions like the Shift Lock key on a standard typewriter, but generates only alphabetic characters in uppercase. The key light goes on when pressed, and goes out when pressed again.

**5. LEFT/RIGHT TAB SET Key**

This tabulator control key is labeled with arrows pointing left for uppercase and right for lowercase.

In uppercase, this key (LEFT TAB SET) moves the cursor back to the previous tab set. If no tab is set, the cursor moves to the left margin.

In lowercase, this key (RIGHT TAB SET) moves the cursor forward to the first tab set. If no tab is set beyond the column in which the cursor is positioned, the cursor remains stationary.

**6. LOC/ESC Key**

In uppercase, this key (LOCAL) is used to perform local escape functions that are not transmitted to the DBS 16 computer.

In lowercase, this key (ESCAPE) is used in conjunction with ASCII characters to perform specific terminal functions, and to set and reset certain modes of operation.

**7. SET-UP/SCROL Key**

In uppercase, this key (SET-UP) places the VDT in Setup/Self-Test mode, and displays the Setup Status Line at the bottom of the screen (line 25). This line consists of eight fields that can be changed by using the T key (uppercase) to toggle the modes within each field. These fields are accessed by using the LEFT/RIGHT TAB SET keys to move the cursor left or right on the line.

In lowercase, this key (SCROL) continually displays new data as it is being read in from the computer. Press this key once to halt scrolling and a second time to restart it.

**8. PRINT Key**

This key prints all data between the HOME position and the cursor position, to the printer attached to the VDT. The data is printed exactly as it appears onscreen.

**9. Function Keys (F1-F8)**

These eight function keys, labeled F1 through F8, are pre-programmed with 16 fixed (dedicated) three-character messages (including 8 additional functions in uppercase).

**10. DEL CHAR/INS Key**

In uppercase, this key (DEL CHAR) deletes the character at the current cursor position. Upon deletion, the data on the same line following the cursor is moved one character position to the left.

In lowercase, this key (INS CHAR) inserts a character, and moves the data to the right of the cursor one character position to the right.

**11. DEL LINE/INS Key**

In uppercase, this key (DEL LINE) deletes the entire line of data that the cursor is currently on, and moves the remaining lines of data (below the cursor) up one line.

In lowercase, this key (INS LINE) inserts a blank line above the line containing the cursor, and moves all lines below the cursor line down one line.

**12. EOP ERASE/EOL Key**

In uppercase, this key (EOP ERASE) deletes data from the current cursor position to the end of the page.

In lowercase, this key (EOL ERASE) deletes data from the current cursor position to the end of the line.

**13. CLEAR Key**

This key deletes an entire screen (25 lines) of data from the display screen and memory.

CAUTION

DO NOT PRESS THIS KEY DURING TEXT PREPARATION (EDITING).  
THE DATA YOU HAVE JUST ENTERED CAN BE PERMANENTLY LOST.

**14. BACKSPACE (←) Key**

This key, labeled with a left pointing arrow, moves the cursor one character position to the left each time it is pressed. Pressing the key continuously, moves the cursor one space at a time to the left until it reaches the left margin; it then continues to move up one line and over to the right margin. It continues moving to the left until the key is released.

**15. DEL Key**

This key sends a delete code (7H hex code) to the DBS 16 computer.

**16. RETURN (<-J) Key**

This key, labeled with an arrow pointing down and to the left, moves the cursor down one line and over to the left margin.

**17. LINE FEED Key**

This key moves the cursor down to the next line of text. The cursor remains at the same character position.

**18. PF (1-3) Keys**

These three programmable function keys, labeled PF1 through PF3, can be programmed by the user to perform various functions, such as storing data for subsequent display and/or transmission. There are three additional functions in uppercase that can be programmed.

**19. SEND Key**

This key sends all data between the HOME and cursor positions, to the computer.

**20. Cursor Control Keys**

These keys move the cursor one character position in the direction indicated on the key pressed.

**21. BREAK Key**

This key operates in conjunction with the SHIFT and CTRL keys to reset the VDT to its power-up state. When used with the CTRL key, it stops data transmission, if an error is detected during a send operation.

**22. ENTER Key**

This key functions like the RETURN key and enters data into the computer.

**B.3 VDT CONNECTORS AND CONTROLS**

The connectors and controls at the rear of the display terminal are divided into two rows: top and bottom (see Figure B-4).

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APPENDIX B. DS 81 DISPLAY TERMINAL GUIDE

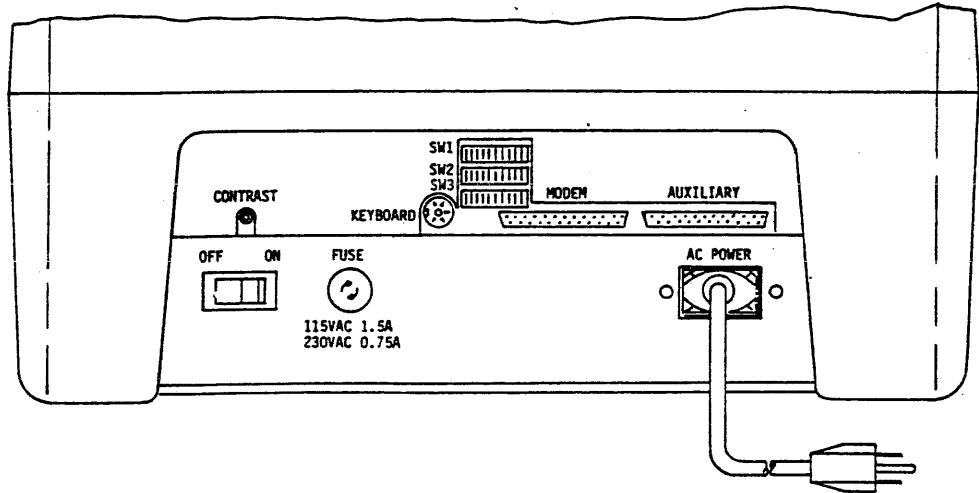


Figure B-4. DS 81 Video Display Terminal: Rear View

**Connectors and Controls: Top Row**

**CONTRAST Knob** - This control lightens and darkens the contrast of the characters onscreen.

**KEYBOARD Port** - This port is used to plug in the coiled cable already attached to the keyboard.

**DIP Switches - SW1, SW2, SW3:** These switches control terminal communications and user options:

**Switch SW1 - Modem Communications**

Configures the DS 81 VDT for compatibility with the DBS 16.

**Switch SW2 - Auxiliary Communications**

Configures the DS 81 VDT for compatibility with a serial printer connected to the display terminal.

Switch SW3 - Options

Configures several display terminal and keyboard features.

MODEM Port - This port is used as a cable connection between the VDT and the Desktop Unit. The SDL 4-pin connector end of the cable fits into this port.

AUXILIARY Port - This is an RC-232C serial port that can be used to connect a serial printer. It conforms to the EIA standards for serial interfacing between data terminal equipment and data communications equipment.

**Connectors and Controls: Bottom Row**

OFF/ON Switch - This rocker switch is used to power-up and shut down the DBS 16 system.

FUSE - This accepts a 115 VAC, 1.5A/230 VAC, .75A fuse.

AC POWER Receptacle - This port is used to connect the power cord for the display terminal.

**B.4 INSTALLATION**

Follow these steps to connect the DS 81 VDT to your DBS 16 system:

1. Place the keyboard in front of the display terminal.
2. Plug the coiled cable (attached to the keyboard) into the KEYBOARD port at the rear of the display terminal (see Figure B-5).
3. Plug the 25-pin connector end of the computer cable into the MODEM port at the rear of the display terminal.

**CAUTION**

DO NOT PLUG THE POWER CORD FOR THE VDT INTO AN AC OUTLET WITH THE POWER ON/OFF SWITCH IN THE ON POSITION. OTHERWISE, THE DISPLAY TERMINAL COULD SUSTAIN DAMAGE.



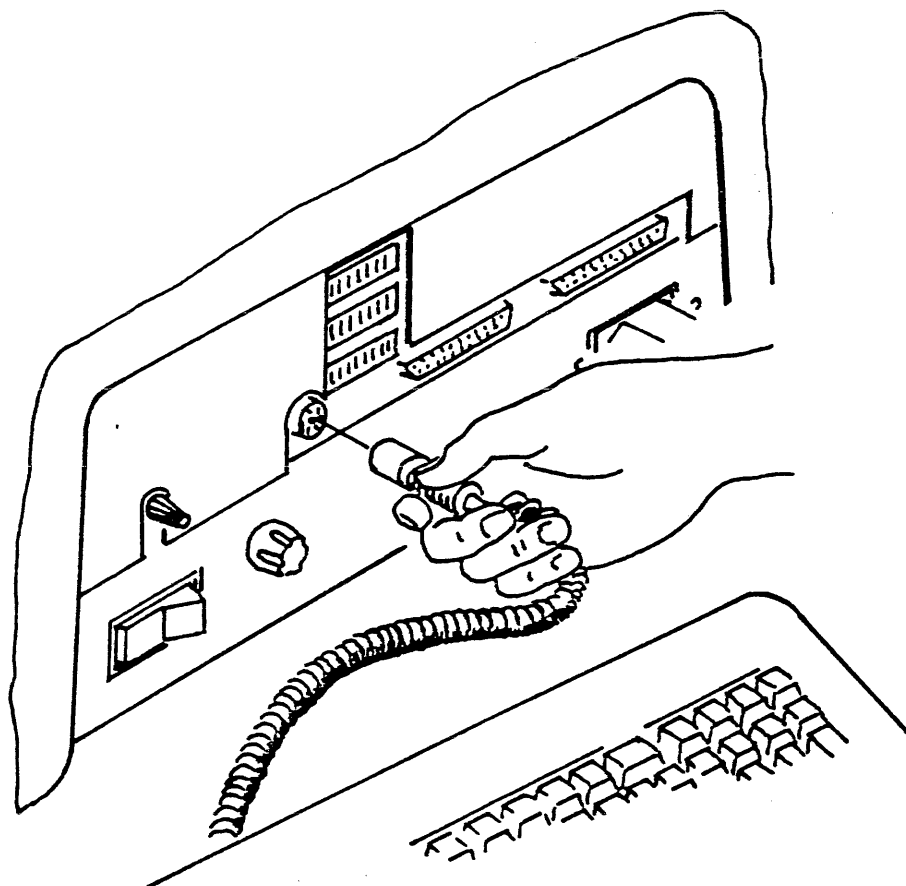


Figure B-5. Connecting the Keyboard to the Display Terminal

4. Plug the female connector end of the power cord for the VDT into the AC POWER receptacle at the rear of the display terminal.
5. Make sure the Power ON/OFF switch is in the OFF position. Plug the male connector end of the VDT power cord into a three-prong wall receptacle or other properly grounded ac outlet.
6. Refer to the appropriate installation procedure in Section 2 to resume installing the type of system you are using.

## B.5 USER HELP GUIDE

### B.5.1 Frequently Used Keyboard Commands

The following tables outline how to select operating modes, data transmission, print transmission, screen control, and clock display operations.

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Table B-1. Operating Mode Selection

MODE	TO SELECT
Conversation Mode-Full Duplex Communication	Enter <b>ESC</b> <b>C</b> after selection of Full Duplex (FDX) in Setup/Self-Test Mode.
Conversation Mode-Half Duplex Communication	Enter <b>ESC</b> <b>C</b> after selection of Half Duplex (HDX) in Setup/Self-Test Mode.
Setup/Self-Test Mode	Enter <b>SHIFT</b> <b>SET-UP</b> (once to select and again to disable).
Block Mode	Enter <b>ESC</b> <b>SHIFT</b> <b>B</b> .
Local Mode	Enter <b>SHIFT</b> <b>LOCAL</b> or select "LOC" in Setup/Self-Test Mode.
Auto Page Mode	Enter <b>ESC</b> <b>v</b> to select; <b>ESC</b> <b>w</b> to exit; and <b>ESC</b> <b>SHIFT</b> <b>J</b> or <b>ESC</b> <b>SHIFT</b> <b>K</b> to change display pages.
Write Protect and Protect Modes	<p>Enter <b>ESC</b> <b>SHIFT</b> <b>)</b> to select Write Protect; <b>ESC</b> <b>SHIFT</b> <b>(</b> to disable Write Protect (before Protect Mode is selected).</p> <p>Enter <b>ESC</b> <b>SHIFT</b> <b>&amp;</b> to select Protect Mode; <b>ESC</b> <b>'</b> to disable Protect Mode.</p>

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Table B-2. Data Transmission Operations

OPERATION	TO SELECT
Send Page All (transmits entire display.)	Press <input type="button" value="SEND"/> key.
Send Page Unprotected (sends only unprotected data)	Enter <input type="button" value="SHIFT"/> <input type="button" value="SEND"/> .
Send Line All (transmits entire line)	Enter <input type="button" value="ESC"/> <input type="button" value="6"/> .

OPERATION	TO SELECT
Send Line Unprotected (sends only unprotected data on line)	Enter <input type="button" value="ESC"/> <input type="button" value="4"/> .
Send Message All (transmits all data between STX and ETX)	Enter <input type="button" value="ESC"/> <input type="button" value="s"/> .
Send Message Unprotected (sends only unprotected data between STX and ETX)	Enter <input type="button" value="ESC"/> <input type="button" value="SHIFT"/> <input type="button" value="S"/> .

Table B-3. Print Transmission Operations

OPERATION	TO SELECT
Print Page All (prints all data exactly as shown on screen)	Press <input type="button" value="PRINT"/> key.
Print Page Unprotected (prints only unprotected data on screen)	Enter <input type="button" value="SHIFT"/> <input type="button" value="PRINT"/> .

Table B-4. Screen Control Operations

OPERATION	TO SELECT
Reverse Video Display (black characters on green background)	Enter <input type="text" value="ESC"/> <input type="text" value="b"/> .
Normal Video Display (green characters on a black background)	Enter <input type="text" value="ESC"/> <input type="text" value="d"/> .
Disable Video Display (turns screen off)	Enter <input type="text" value="ESC"/> <input type="text" value="o"/> .
Enable Video Display (turns screen on)	Enter <input type="text" value="ESC"/> <input type="text" value="n"/> .

Table B-5. Clock Display Operations

OPERATION	TO SELECT
Disable Clock Display (turns clock off)	Enter <input type="text" value="ESC"/> <input type="text" value="SPACE"/> <input type="text" value="8"/> .
Enable Clock Display (turns clock on)	Enter <input type="text" value="ESC"/> <input type="text" value="SPACE"/> <input type="text" value="7"/> .
Set Time or Alarm	

**B.5.2 DIP Switch Settings (Default Values)**

There are three rows of switches, labeled SW1, SW2, and SW3, at the rear of the display terminal. Each row contains 10 DIP switches that are used to configure the Modem Port and Auxiliary Port data word characteristics, transmit/receive baud rate, and communications protocol. Also configured by these switches are several display and keyboard features, as well as the default setting for terminal emulation (VDT or TVI 925). Figure B-6 shows all the switch settings for use in configuring the VDT for compatibility with the Modem Port device (modem or host computer) and Auxiliary Port device (e.g., printer, plotter, scanner). Refer to the manuals for the modem(s), computer (DBS 16 User's), or peripheral device(s) to determine the proper configuration for the VDT Modem Port and Auxiliary Port.

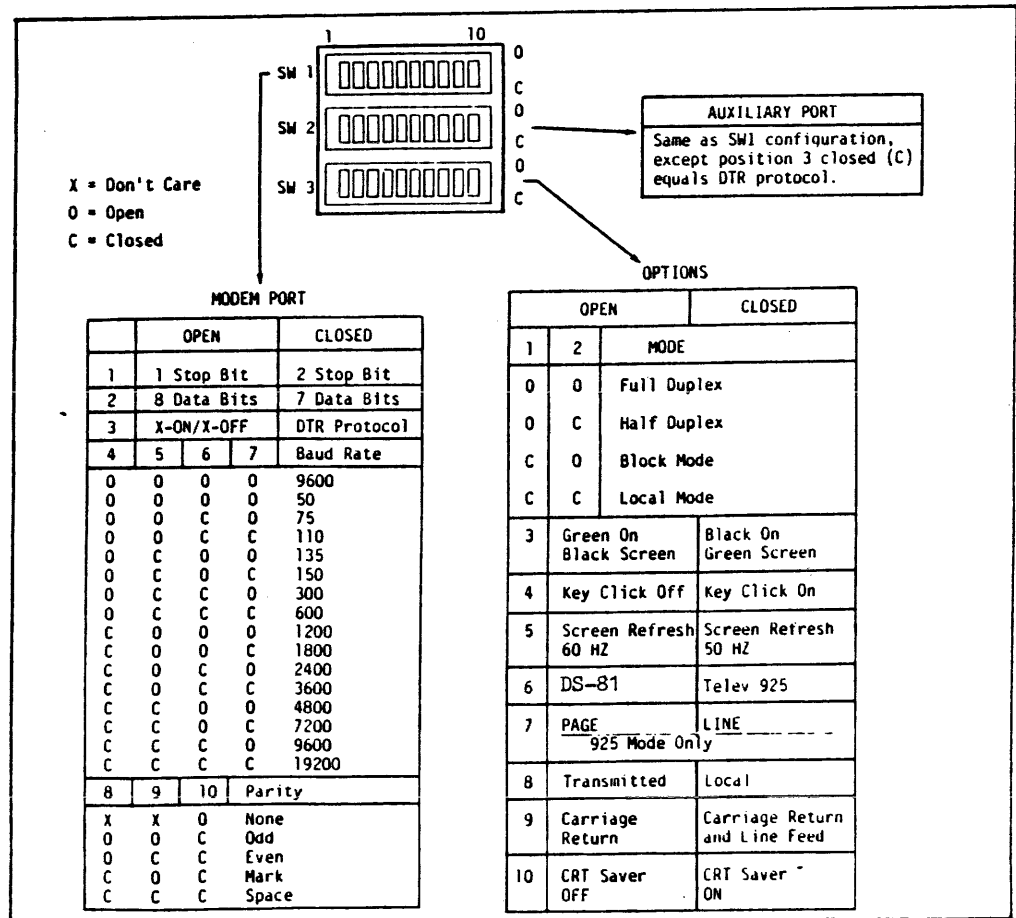


Figure B-6. DIP Switch Settings (Default Values)

**B.5.3 VDT Operating Modes**

Table B-6 lists and describes the VDT operating modes. Note that several modes affect communication with the host computer (DBS 16), while others affect keyboard and/or display operations.

Table B-6. VDT Operating Modes (Part 1 of 4)

MODE	TO SELECT	DESCRIPTION
Conversation Mode - Full Duplex Communication	[ESC] [C] or selection of Full Duplex (FDX) while in Setup/Self-Test Mode	All characters entered at keyboard are transmitted to host computer. Characters are not displayed unless "echoed back" (returned) by host.
Conversation Mode - Half Duplex Communication	[ESC] [C] or selection of Half Duplex (HDX) while in Setup/Self-Test Mode	All characters entered at keyboard (except Control characters) are displayed on screen and transmitted to host computer at same time.
Block Mode	[ESC] [SHIFT] [B] or selection of Block Mode (BLK) while in Setup/Self-Test Mode	All characters entered at keyboard (except Control characters) are displayed on screen. Characters are not transmitted to host computer (or printer) until [SEND] (or [PRINT]) key is pressed. Permits editing or verification of data before transmission.
Local Mode	[SHIFT] [LOCAL] or selection of Local Mode while in Setup/Self-Test Mode	VDT is "disconnected" from host computer; functions as "stand-alone" system for local data entry, editing, and print operations. Pressing unshifted LINE key disables Local Mode and places VDT "on-line" with host computer.
Write Protect and Protect Modes	[ESC] [SHIFT] [>] to select Write Protect; [ESC] [SHIFT] [C] to disable Write Protect (before Protect Mode is selected)  [ESC] [SHIFT] [&] to select Protect Mode; [ESC] ['] to disable Protect Mode	Write Protect Mode permits characters, lines, or an entire page to be designated as "protectable" fields of data. Protect Mode is then set to prevent the designated fields from being overwritten or erased from the screen. Protected fields are displayed at reduced intensity.

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Table B-6. VDT Operating Modes (Part 2 of 4)

MODE	TO SELECT	DESCRIPTION
Auto Page Mode (option)	<b>ESC</b> <b>v</b>	Permits the use of two display pages when Auto Page option is installed. Second page of display appears automatically when first page is full. Allows display of Page 1 or Page 2 to be selected at keyboard by <b>ESC</b> <b>J</b> or <b>ESC</b> <b>K</b> , respectively. Cursor positioning operations may effect automatic switching from page to page.  The Auto Page Mode is disabled by <b>ESC</b> <b>w</b> .
Graphics Mode	<b>ESC</b> <b>SHIFT</b> <b>\$</b>	Permits access to line graphics character subset or block graphics character subset. Line Graphics are available when Standard (English) Character Set is selected and block graphics are available when International Character Set is selected.  The Graphics Mode is disabled by <b>ESC</b> <b>%</b> .
International Character Set/ Block Graphics Mode	<b>CTRL</b> <b>\</b>	Permits use of 48 international characters and 64 block graphics characters when Graphics Mode is selected.  Mode is disabled by <b>CTRL</b> <b>]</b> , which returns VDT to Standard (English) Character Set.
Transmission On/Off (X-On/ X-Off) Mode	<b>CTRL</b> <b>O</b>	VDT monitors input data buffer to determine when buffer is "almost full" and "almost empty." When data buffer is almost full, VDT sends DC3 control code ( <b>CTRL</b> <b>S</b> ) to host computer to stop data transmission. When data buffer is almost empty, VDT sends DC1 control code ( <b>CTRL</b> <b>Q</b> ) to host computer to resume data transmission. The X-On/X-Off Mode is disabled by <b>CTRL</b> <b>N</b> , which returns the VDT to the Data Terminal Ready (DTR) Mode.

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Table B-6. VDT Operating Modes (Part 3 of 4)

MODE	TO SELECT	DESCRIPTION
Data Terminal Ready (DTR) Mode	<b>CTRL</b> <b>N</b>	DTR is a standard communications control signal, which is normally "true" when VDT is ready to receive data. When input data buffer is "almost full", the DTR signal goes "false", signalling host computer to stop data transmission. When input data buffer is "almost empty", the DTR signal returns to its true state, signalling host to resume data transmission.
Auxiliary Port Extension Mode	<b>ESC</b> <b>SHIFT</b> <b>@</b>	All characters received from host computer are acted upon by VDT and passed on to Auxiliary Port device. VDT communications with host do not change. Characters entered at keyboard cannot be sent to Auxiliary Port unless echoed back by host. The Auxiliary Port Extension Mode is disabled by <b>ESC</b> <b>A</b> .
Auxiliary Port Bi-Directional Mode	<b>CTRL</b> <b>R</b>	All characters received from host computer are acted upon by VDT and passed on to Auxiliary Port device. All characters received from Auxiliary Port device are sent to host and not acted upon by VDT. Keyboard communications with host do not change. Characters entered at keyboard cannot be sent to Auxiliary Port device unless echoed back by host. The Auxiliary Port Bi-Directional Mode is disabled by <b>CTRL</b> <b>T</b> .
Auxiliary Port Transparent Mode	<b>ESC</b> <b>^</b>	All characters received from host computer are passed on to Auxiliary Port device and not acted upon by VDT. There is no display of incoming data. Characters entered at keyboard are sent to host but are not displayed or acted upon by VDT. The Auxiliary Port Transparent Mode is disabled by <b>ESC</b> <b>a</b> .



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Table B-6. VDT Operating Modes (Part 4 of 4)

MODE	TO SELECT	DESCRIPTION
Monitor Mode	<b>ESC</b> <b>SHIFT</b> <b>U</b>	<p>All characters entered at keyboard and received from host computer are displayed but not acted upon. ASCII control code and escape sequence characters will be displayed with text.</p> <p>The Monitor Mode is disabled by <b>ESC</b> <b>X</b>.</p>
Setup/Self-Test Mode	<b>SHIFT</b> <b>SETUP</b>	<p>Permits keyboard selection and setting of VDT communications parameters and operating modes. Displays eight fields on 25th line of display screen. Fields display current settings selected for Local or Duplex Editing; Modem Port Monitor Mode ("on" or "off"); Terminal Emulation Mode (VDT or Teletype 925); Keyboard Lock/Unlock; Modem Port Baud Rate (50 to 19,200 baud); Modem Port Mode (Local, Block, Full-Duplex, or Half-Duplex); and Auxiliary Port Baud Rate (50 to 19,200 baud). Settings for each field may be changed to alternate setting or settings through simple keyboard manipulation. Setup/Self-Test Mode also permits VDT to conduct self-tests of system memory and visual attributes.</p> <p>The Setup/Self-Test Mode is disabled by again entering <b>SHIFT</b> <b>SETUP</b>.</p>

**B.5.4 Set Video Display Attribute (ESC-G or Hex 47)**

This sequence, followed by an additional character, causes the VDT display to exhibit the desired video attribute or any combination of attributes. For example, to set the reverse video attribute, you would press the ESC, G, and 4 keys. A list of the available attributes is given in Table B-7.

**VDT Mode**

No changes take place onscreen, but the attribute mode is set. Each subsequent displayable character received will exhibit the attribute(s) selected. This attribute mode could also be termed "character attribute" or "non-embedded attribute".

**TVI 925 Mode**

An attribute character is stored onscreen at the cursor position (if the cursor is at an unprotected location -- otherwise, the cursor moves toward the right until an unprotected position is found). The attribute character causes all characters to the right of the attribute character to exhibit the desired attribute. The attribute field continues to the end of the current line if "line" attributes are in effect; to the end of the current screen page if "page" attributes are in effect; or until another attribute character is encountered.

The attribute character is stored as a protectable character. If the screen is cleared when the Protect Mode is enabled, then the attribute fields will not be cleared (unless Clear All To Nulls is invoked). This attribute mode could also be termed "field attribute" or "embedded attribute".

Table B-7. Video Display Attributes

ATTRIBUTE SELECT CODES	RESULTING ATTRIBUTES
0	No attributes (normal field)
1	Blank field
2	Blinking field
3	Blinking, blank field (blank)
4	Reverse video field
5	Reverse video, blank field
6	Reverse video, blinking field
7	Reverse video, blinking, blank field (reverse video, blank)
8	Underline field
9	Underline, blank field
:	Underline, blinking field
;	Underline, blinking, blank field (underline, blank)
<	Underline, reverse video field
=	Underline, reverse video, blank field
>	Underline, reverse video, blinking field
?	Underline, reverse video, blinking, blank field (underline, reverse video, blank)

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**B.5.5 Position Cursor at Row and Column Coordinates (ESC-- or Hex 3D)**

This sequence, followed by two additional characters, causes the cursor to be positioned on the current screen page at the desired row and column (Y and X) coordinates. The row and column ASCII characters and their corresponding Hex code for each cursor position (Y and X coordinates) are given in Table B-8.

NOTE: The ASCII control codes NUL (00) through US (1F) are treated like the displayable characters "Space" (20) through "?" (3F). Row values should be from "SPACE" to "7". If a value greater than "7" is entered, the "7" is assumed.

Table B-8. Cursor Positioning Code

ROW (Y) OR COL. (X)	ASCII CHAR	HEX CODE	COL. (X)	ASCII CHAR	HEX CODE	COL. (X)	ASCII CHAR	HEX CODE
1	SPACE	20	25	8	38	53	T	54
2	!	21	26	9	39	54	U	55
3	"	22	27	:	3A	55	V	56
4	#	23	28	;	3B	56	W	57
5	\$	24	29	<	3C	57	X	58
6	%	25	30	=	3D	58	Y	59
7	&	26	31	>	3E	59	Z	5A
8	'	27	32	?	3F	60	[	5B
9	(	28	33	@	40	61	\	5C
10	)	29	34	A	41	62	]	5D
11	*	2A	35	B	42	63	^	5E
12	+	2B	36	C	43	64	-	5F
13	,	2C	37	D	44	65	`	60
14	-	2D	38	E	45	66	a	61
15	.	2E	39	F	46	67	b	62
16	/	2F	40	G	47	68	c	63
17	0	30	41	H	48	69	d	64
18	1	31	42	I	49	70	e	65
19	2	32	43	J	4A	71	f	66
20	3	33	44	K	4B	72	g	67
21	4	34	45	L	4C	73	h	68
22	5	35	46	M	4D	74	i	69
23	n	36	47	N	4E	75	j	6A
24	7	37	48	O	4F	76	k	6B
			49	P	50	77	l	6C
			50	Q	51	78	m	6D
			51	R	52	79	n	6E
			52	S	53	80	o	6F

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**B.5.6 VDT Escape Sequences**

LSB	MSB							
	0	1	2	3	4	5	6	7
0	MUL	DLE	(SPACE) ACCESS CLOCK <sub>1</sub>	0	@ ENABLE EXTENSION MODE	P PRINT PAGE ALL	' ENABLE TRANSPARENT MODE	p DEFINE PRINT TERMINATOR CHARACTER <sub>1</sub>
1	SOH	DC1	1	1 SET TAB	A DISABLE EXTENSION MODE	O INSERT CHAR	a DISABLE TRANSPARENT MODE	9
2	STX	DC2	* ENABLE KEYBOARD	2 CLEAR TAB AT CURSOR POSITION	B BLOCK MODE	R DELETE LINE	b REVERSE VIDEO	r
3	ETX	DC3	' DISABLE KEYBOARD	3 CLEAR ALL TABS	C COPY MODE	8 SEND MESSAGE UNPROTECTED	c	s SEND MESSAGE ALL
4	EDT	DC4	S ENABLE GRAPHICS MODE	4 SEND LINE UNPROTECT	D	T ERASE LINE FROM CURSOR (UN-PROTECTED)	d NORMAL VIDEO	t ERASE LINE TO NULLS
5	END	NAK	% DISABLE GRAPHICS MODE	5 SEND PAGE UNPROTECT	E INSERT LINE OF SPACES	U ENABLE MONITOR MODE	e	u DISABLE MONITOR MODE
6	ACK	SYN	& SET PROTECT MODE	6 SEND LINE ALL	F	V	f LOAD CURSOR LINE <sub>1</sub>	v ENABLE AUTO PAGE
7	BEL	ETB	' EXIT PROTECT MODE	7 SEND PAGE ALL	G SET VISUAL ATTRIBUTE <sub>1</sub>	W DELETE CHAR	g DISPLAY USER LINE	w DISABLE AUTO PAGE
8	BS	CAN	{ RESET WRITE PROTECT NORMAL INTENSITY	8 ENABLE SMOOTH SCROLL	H PRINT UNPROTECTED PAGE	X DISABLE MONITOR MODE	h DISABLE 25TH DISPLAY LINE	x SEND FUNCTION DELIMITERS <sub>1</sub>
9	HT	EM	} SET WRITE PROTECT REDUCED INTENSITY	9 DISABLE SMOOTH SCROLL	I BACK TAB	Y ERASE PAGE FROM CURSOR (UN-PROTECTED)	i TAB (PROTECT MODE)	y ERASE PAGE TO NULLS
A	LF	SUB	* CLEAR ALL TO NULLS	: CLEAR UNPROTECTED TO NULLS	J SWITCH TO PREVIOUS PAGE	Z	j REVERSE LINE FEED	z
B	VT	ESC	+ CLEAR UNPROTECTED TO SPACES	; CLEAR UNPROTECTED TO SPACES	K SWITCH TO NEXT PAGE	[	k LOCAL EDIT KEYS	{
C	FF	FS	9 CLEAR UNPROTECTED TO PROTECTED SPACES	< DISABLE KEY CLICK	L	\	l TRANSMIT EDIT KEYS	LOAD/ EXECUTE FUNCTION KEYS <sub>1</sub>
D	CR	GS	- POSITION CURSOR <sub>1,2</sub>	* LOAD CURSOR ADDRESS <sub>1</sub>	M SEND TERMINAL I D	]	m LOAD MESSAGE LINES <sub>1</sub>	}
E	SO	RS	. SELECT CURSOR ATTRIBUTE <sub>1</sub>	> ENABLE KEY CLICK	N	^ REPEAT COMMAND <sub>1</sub>	n TURN ON VIDEO DISPLAY	~ BELL PITCH AND DURATION <sub>1</sub>
F	SI	UT	/ SEND CURSOR COORD'S <sub>1</sub>	? SEND CURSOR ADDRESS <sub>2</sub>	O	- CREATE ATTRIBUTE FIELD <sub>1</sub>	o TURN OFF VIDEO DISPLAY	

1 MULTIPLE CHARACTERS REQUIRED  
2 INITIATED FROM HOST

Figure B-7. VDT Escape Sequences

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Table B-9. Escape Sequence Summary (Part 1 of 2)

SEQUENCE	ESCAPE SEQUENCE FUNCTION
SPACE	Allows access to Real-Time Clock and its functions
"	Unlocks Keyboard - Allows keypresses to be sent
#	Locks Keyboard - Keypresses will not be sent
\$	Enable Graphics Mode - Gain access to Block and Line Graphics
Z	Disable Graphics Mode - Go back to normal character mode
&	Enable Protect Mode
'	Disable Protect Mode
(	Disable Write Protect Mode
)	Enable Write Protect Mode
*	Clear Entire Screen to Nulls
+	Clear Unprotected Locations to Spaces
,	Clear Unprotected Locations to Protected Spaces
-	Position Cursor Page, Row, and Column
.	Select Cursor's Display Format
/	Send Cursor's Page, Row, and Column Coordinates to Host
1	Set Columnar Tab at Cursors Column Position
2	Clear Columnar Tab at Cursors Column Position
3	Clear all Columnar Tab Stops
4	Send Unprotected Cursor Line to Host
5	Send Unprotected Page to Host
6	Send Entire Cursor Line to Host
7	Send Entire Page to Host
8	Enable Smooth Scroll Mode - Disable Hard Scroll
9	Disable Smooth Scroll Mode - Enable Hard Scroll
:	Clear Unprotected Locations to Nulls
;	Clear Unprotected Locations to Spaces
<	Disable Key Click Feature
=	Position Cursor Row and Column Coordinates
>	Enable Key Click Feature
?	Send Cursor Row and Column Coordinates to Host
@	Enable Extension Mode
A	Disable Extension Mode
B	Enter Block Communications Mode
C	Enter Conversational Communications Mode (FDX, HDX)
E	Insert Line of Spaces at Cursor Line
G	Set Visual Attribute (Blank, Blink, Reverse Video, Underline)
H	Print Unprotected Page Only (Send to Auxiliary Port)
I	Do a Backwards Tab (Columnar or Unprotected Field)
J	Switch to Previous Display Page
K	Switch to Next Display Page
M	Send Terminal ID to Host
P	Print Entire Display Page (Send to Auxiliary Port)
Q	Insert Blank at Cursor Position
R	Delete Line Cursor Is On
S	Send Unprotected Message Only (Look for STX and ETX)
T	Erase from Cursor Position to End of Line with Spaces
U	Enable Monitor Mode
W	Delete Character at Cursor Position
X	Disable Monitor Mode
Y	Erase from Cursor Position to End of Page with Spaces
^	Repeat next Character, Control Code, or Escape Sequence

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Table B-9. Escape Sequence Summary (Part 2 of 2)

SEQUENCE	ESCAPE SEQUENCE FUNCTION
_	Create Non-Embedded Attribute Field
\	Enable Transparent Mode
a	Disable Transparent Mode
b	Create Reverse Display - Black Characters on a Green Background
d	Create Normal Display - Green Characters on a Black Background
f	Load User Line with Text
g	Display User Line
h	Turn Off 25th Display Line
i	Do a Tab (Works in Protect Mode Only)
j	Reverse Line Feed (Includes Scrolling)
k	Select Local Edit Keys
l	Select Transmitting Edit Keys
m	Load Host Message Line with Text
n	Enable Video Display
o	Disable Video Display
p	Program Print Page Termination Character
s	Send Entire Message to Host (Look for STX and ETX)
t	Erase from Cursor Position to End of Line with Nulls
u	Disable Monitor Mode
v	Enable Auto Page Mode
w	Disable Auto Page Mode
x	Define "Send Function" Delimiter Values
y	Erase from Cursor Position to End of Page with Nulls
:	Load Function Key Memory with User Text or Host Macro; Execute Same
~	Program Bell ("Beeper") Pitch and Duration

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Table B-10. Data Editing Operations (Local or Block Mode)  
(Part 1 of 2)

OPERATION	FROM KEYBOARD	FROM HOST	HEX CODE	DESCRIPTION
Clear Unprotected Display	SHIFT CLEAR	ESC + or ESC ;	2B 3B	Unprotected data is cleared from display and replaced with space codes. Moves cursor to HOME or first unprotected position.
Clear All to Nulls	CLEAR	ESC *	2A	All data (protected and unprotected) is cleared from display and replaced with null codes. Moves cursor to HOME position.
Erase Line	ERASE EOL	ESC T	54	All unprotected data, from cursor position to end of line (or current field if Protect Mode is set), are cleared to spaces. Write Protect Mode is not reset.
Erase Page	SHIFT EOP ERASE	ESC Y	59	All unprotected data, from cursor position to end of screen, is cleared to spaces. Write Protect Mode is not reset.
Delete Line	SHIFT DEL LINE	ESC R	52	Inactive in Protect Mode. Deletes all data on line in which cursor rests. All subsequent lines are moved up one line. Write Protect Mode is reset. Cursor moves to first position in line.
Insert Line	LINE INS	ESC E	45	Inactive in Protect Mode. Line in which cursor rests and all subsequent lines are moved down one line to create blank line. Data on bottom line is lost if Auto Page is not set. Cursor moves to first position in line. Write Protect Mode is reset.

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Table B-10. Data Editing Operations (Local or Block Mode)  
(Part 2 of 2)

OPERATION	FROM KEYBOARD	FROM HOST	HEX CODE	DESCRIPTION
Delete Character	SHIFT DEL CHAR	ESC W	57	Deletes character under cursor and moves all unprotected characters located to the right of cursor one position to left. Protected characters under cursor and those following a Protected character are not affected. Write Protect Mode is not reset.
Insert Character	CHAR INS	ESC Q	51	All unprotected characters, from cursor position to end of line (or current field if Protect Mode is set), are moved one position to right. Any character in last position of line (or field) is lost. Protected characters under cursor and those following a protected character are not affected. Write Protect Mode is not reset.
Set Tab	ESC 1	ESC 1	31	Sets tab stop for column where cursor is positioned.
Clear Tab	ESC 2	ESC 2	32	Clears tab stop from column where cursor is positioned.
Clear All Tabs	ESC 3	ESC 3	33	Clears all tab stops for all columns.



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Table B-11. Data Transmission Operations (SEND)(Block Mode)  
(Part 1 of 2)

OPERATION	FROM KEYBOARD	FROM HOST	HEX CODE	DESCRIPTION
Send Page All	<b>SEND</b>	ESC 7	37	Sends all unprotected and protected data on screen, followed by a carriage return (CR) character, to host computer. Transmission starts at HOME position and ends at cursor position. ESC ) and ESC ( are transmitted to set and reset Write Protect Mode.
Send Page Unprotected	<b>SHIFT SEND</b>	ESC 5	35	Sends all unprotected data on screen, followed by a carriage return (CR) character, to host computer. Transmission starts at HOME position and ends at cursor position.
Send Line Unprotected	<b>ESC 4</b>	ESC 4	34	Sends line of unprotected data, followed by carriage return (CR) character, to host computer. Transmission starts at beginning of line and ends at cursor position.
Send Line All	<b>ESC 6</b>	ESC 6	36	Sends line of unprotected and protected data, followed by a carriage return (CR) character, to host computer. Transmission starts at beginning of line and ends at cursor position. ESC ) and ESC ( are transmitted to set and reset Write Protect Mode.
Send Message Unprotected	<b>ESC SHIFT S</b>	ESC S	53	Backspaces cursor to previous Unprotected STX code or HOME position. Transmission starts at beginning of first unprotected character following STX code or HOME. Transmission continues until ETX code or end of screen is encountered. CR is transmitted at end of message and cursor remains at ETX position or is returned to HOME position if end of screen was encountered.

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Table B-11. Data Transmission Operations (SEND)(Block Mode)  
 (Part 2 of 2)

OPERATION	FROM KEYBOARD	FROM HOST	HEX CODE	DESCRIPTION
Send Message All	ESC s	ESC s	73	Backspaces cursor to previous STX code or HOME position. Transmission begins at first character following STX code or HOME. All protected and unprotected characters are sent to host. Transmission continues until ETX code or end of screen is encountered. CR is transmitted at end of message and cursor remains at ETX position or is returned to HOME or first unprotected position if end of screen was encountered.

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Table B-12. Print Transmission Operations (Part 1 of 2)

OPERATION	FROM KEYBOARD	FROM HOST	HEX CODE	DESCRIPTION
Print Page Formatted/Print Page All	PRINT	ESC P	50	Sends all data on screen line for line, to Auxiliary Port for printing. Transmission starts at HOME position and ends at cursor position. If Auto Page is set, screen advances to second page during PRINT operation, allowing data entry and communications with host computer to continue.
Print Page Unprotected	SHIFT PRINT	ESC H	48	Send all unprotected data on screen to Auxiliary Port for printing. Transmission starts at HOME position and ends at cursor position. Protected data is sent as spaces. If Auto Page is set, screen advances to second page during PRINT operation, allowing data entry and communications with host computer to continue.

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Table B-12. Print Transmission Operations (Part 2 of 2)

OPERATION	FROM KEYBOARD	FROM HOST	HEX CODE	DESCRIPTION
Auxiliary Port Extension Print	<b>ESC</b> <b>SHIFT @</b>	ESC @	40	All characters received from host computer are acted upon by VDT and passed on to Auxiliary Port for printing. Communications with host are not affected. VDT cannot send data to Auxiliary Port unless echoed back from host. Extension Print Mode is disabled by <b>ESC</b> <b>A</b> .
Auxiliary Port Transparent Print	<b>ESC</b> <b>^</b>	ESC	60	All characters received from host are passed on to Auxiliary Port for printing and are not acted upon by VDT. Incoming data is not displayed. Characters entered at keyboard are sent to host, but are not displayed or acted upon by VDT. Transparent Print Mode is disabled by <b>ESC</b> <b>a</b> .
Auxiliary Port Bidirectional Print	<b>CTRL R</b>	DC2	12	All characters received from host computer are acted upon by VDT and passed on to Auxiliary Port for printing. All characters received from Auxiliary Port device are sent to host computer and are not acted upon by VDT. Communications with host are not affected. VDT cannot send data to Auxiliary Port unless echoed back by host. Bidirectional Print Mode is disabled by <b>CTRL T</b> (DC4).

**B.5.7 Displayable and VDT Control Characters**

		CONTROL CHARACTERS		DISPLAYABLE CHARACTERS					
MSB LSB		0	1	2	3	4	5	6	7
	0	NUL (NO-OP)	DLE	SPACE	0	@	P	`	p
1	SOH	DC1 (X-ON CODE)	!	1	A	Q	a	q	
2	STX	DC2 (ENABLE BIDIRECT)	"	2	B	R	b	r	
3	ETX	DC3 (X-OFF CODE)	#	3	C	S	c	s	
4	EOT	DC4 (DISABLE BIDIRECT)	\$	4	D	T	d	t	
5	ENQ	NAK	%	5	E	U	e	u	
6	ACK	SYN (CURSOR DOWN)	&	6	F	V	f	v	
7	BEL (BEEP)	ETB	'	7	G	W	g	w	
8	BS (←)	CAN	(	8	H	X	h	x	
9	HT (SKIP)	EM	)	9	I	Y	i	y	
A	LF (↓)	SUB (CLEAR UN-PROTECTED TO SPACES)	*	:	J	Z	j	z	
B	VT (↑)	ESC (SEQUENCE LEAD-IN)	+	;	K	[	k	{	
C	FF (→)	FS (INTERNAT'L AND BLOCK CHARACTERS)	,	<	L	\	l	;	
D	CR (RETURN)	GS (STANDARD AND LINE CHARACTERS)	-	=	M	]	m	}	
E	SO (DISABLE X-ON/X-OFF)	RS (HOME)	.	>	N	^	n	~	
F	SI (ENABLE X-ON/X-OFF)	US (NEW LINE)	/	?	O	_	o	DEL	

VDT CONTROL CHARACTERS

USE **CTRL** KEY WITH  
 DISPLAYABLE CHARACTER  
 KEYS TO PRODUCE VDT  
 CONTROL CHARACTERS

Figure B-8. ASCII Chart: Displayable and VDT Control Characters (Standard Character Set)

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Table B-13. Control Code Summary

HEX CODE	ASCII CHAR	FUNCTION
00	NUL	NULL Code - Causes NO-Operation to occur
01	SOH	Undefined
02	STX	Undefined
03	ETX	Undefined
04	EOT	Undefined
05	ENQ	Undefined
06	ACK	Undefined
07	BEL	Bell Code - Sounds the Beeper
08	BS	Back Space Code - Causes cursor to move one character position to left
09	HT	Horizontal Tab Code - Causes cursor to move to next tab on right
0A	LF	Line Feed Code - Causes cursor to move down one line
0B	VT	Vertical Tab Code - Causes cursor to move up one line
0C	FF	Cursor Forward Code - Causes cursor to move one character position to right
0D	CR	Carriage Return Code - Causes cursor to move to first character position on same line
0E	SO	Disables X-On/X-Off protocol for communications
0F	SI	Enables X-On/X-Off protocol for communications
10	DLE	Undefined
11	DC1	X-On Code
12	DC2	Enables Bidirectional Communications Mode
13	DC3	X-Off Code
14	DC4	Disables Bidirectional Communications Mode
15	NAK	Undefined
16	SYN	Cursor Down Code - Causes the cursor to move down one line
17	ETB	Undefined
18	CAN	Undefined
19	EM	Undefined
1A	SUB	Clears all unprotected character positions to spaces
1B	ESC	Lead-in character for escape sequences
1C	FS	Selects International and Block Graphics Character Sets
1D	GS	Selects Standard and Line Graphics Character Sets
1E	RS	Home Cursor Code - Causes cursor to move to upper left corner of screen
1F	US	New Line Code - Causes cursor to move to first column of next lower line

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Table B-14. Operational Control Codes (Part 1 of 2)

CONTROL CODES		HEX CODE	OPERATION
FROM KEYBOARD	FROM HOST		
CTRL SHIFT @	NUL	00	NULL - No operation or "no-op" code. Used as replacement character for spaces when transmitting data. Trailing spaces from cursor to end of line or to end of page are replaced with nulls, thus compressing transmitted data and reducing transmission time.
CTRL G	BEL	07	BEEP - Generates audible tone. Indicates test completion or used to sound alarm.
CTRL H or ←	BS	08	Back Space - Moves cursor left to next unprotected position on same line or on previous line, moving from right to left.
CTRL I or TAB	HT	09	Horizontal Tab - Skips cursor to next tab stop or next unprotected position.
CTRL J or ↓	LF	0A	Line Feed - Moves cursor to next lower line in same column position or to next unprotected position in new line or next line, if necessary.
CTRL K or ↑	VT	0B	Up Line - Moves cursor to previous line in same column position or to next unprotected position (moving from left to right) in new line or next line, if necessary.
CTRL L or →	FF	0C	Forespace - Moves cursor right to next unprotected position on same line or on next lower line, moving from left to right.
CTRL M or RETURN	CR	0D	Return - Moves cursor to first unprotected position in line containing the cursor. Indicates that data entry or data transmission is complete.
CTRL N	SO	0E	Disable X-On/X-Off Mode - Switches transmission control to DTR (Data Terminal Ready) Mode. Refer to table B-6 for details.
CTRL O	SI	0F	Enable X-On/X-Off Mode - Refer to table B-6 for details.
CTRL Q	DC1	11	X-On Code.
CTRL R	DC2	12	Enable Auxiliary Port Bidirectional Mode - Refer to table B-6 for details.

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Table B-14. Operational Control Codes (Part 2 of 2)

CONTROL CODES		HEX CODE	OPERATION
FROM KEYBOARD	FROM HOST		
<b>CTRL S</b>	DC3	13	X-Off Code.
<b>CTRL T</b>	DC4	14	Disable Auxiliary Port Bidirectional Mode - VDT regains control of data sent to Auxiliary Port. Refer to table B-6 for details.
<b>CTRL V</b>	SYN	16	Cursor Down - Same as Line Feed ( <b>CTRL J</b> ) except that if cursor is on bottom line of display, no cursor movement will occur (Auto Page ineffective).
<b>CTRL Z</b>	SUB	1A	Clear Unprotected Characters to Spaces - All unprotected characters on screen are cleared and replaced with spaces. All display modes remain set.
<b>ESC</b> or <b>CTRL C</b>	ESC	1B	Escape - VDT code extension character; must be followed by otherwise displayable character(s) to invoke a specific terminal operation. Also used preceding a control code to cause the control code to be displayed instead of acted upon.
<b>CTRL \</b>	FS	1C	Select International Character Set - Permits use of 48 international characters and 64 block graphics characters.
<b>CTRL ]</b>	GS	1D	Select Standard Character Set - Permits use of standard English characters and 16 line graphics characters.
<b>CTRL ^</b>	RS	1E	HOME - Moves cursor to first character position on screen. If "HOME" is protected, cursor moves to first unprotected position on screen.
<b>CTRL SHIFT _</b>	US	1F	New Line - Causes a combined Return (CR) and Line Feed (LF) to be executed. Moves cursor to first unprotected position on next line.



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**B.5.8 Character Set Access**

The VDT is basically an 8-bit communications machine, and is capable of receiving and displaying 256 characters. If the host device (e.g., computer, modem, controller) is capable of sending and receiving 8-bit data, it may directly access the entire VDT character set. If the host communicates only with 7-bit data, it cannot fully access the character set. To solve this problem, escape sequences and control characters have been provided to make full access possible. Table B-15 contains a breakdown of the VDT character subsets, and describes their access by 7- or 8-bit communication formats.

Table B-15. Host Access to VDT Character Subsets

ASCII	CHARACTER SUBSET	8-BIT ACCESS	7-BIT ACCESS
00 thru 1F	Control Code Characters	Characters are accessed by ESC U sequence, which places VDT in Monitor Mode. All control codes received (range 00 thru 1F) will display the corresponding character.	
20 thru 7E	Normal ASCII Characters	Accessed by sending the corresponding 8-bit code.	
80 thru BF	Block Graphics Characters	Accessed by sending the corresponding 8-bit code.	Accessed by sending ESC \$ FS sequence and then sending Hex 20 thru 5F for desired character.
C0 thru CF	Line Graphics Characters	Accessed by sending the corresponding 8-bit code.	Accessed by sending ESC \$ sequence and then Hex 41 thru 50 for desired character.
D0 thru FF	International Characters	Accessed by sending the corresponding 8-bit code.	Accessed by sending FS control code and then Hex 41 thru 58 for codes D0 thru E8, Hex 61 thru 77 for codes E9 thru FE, and Hex 23 for code FF.

### B.5.9 Dedicated Function Keys

The VDT keyboard contains eight Dedicated Function keys, F1 through F8. These function keys, in the top row of the keyboard, have been pre-programmed with 16 "dedicated" (or fixed) character-string messages. The character-string message contained in each function key is three characters in length. The first and third characters are always the ASCII control characters "SOH" (Start of Heading), and "CR" (Carriage Return). The second character in each string is one of 16 normally displayable ASCII characters, ranging from "@" through "G", inclusive, and "`" through "g", inclusive. The ASCII characters assigned to each Dedicated Function key are as follows.

DEDICATED FUNCTION KEY	TRANSMITTED CHARACTER STRING (ASCII CHARACTER)	
F1	(SOH) @ (CR)	
F2	A	↑
F3	B	
F4	C	
F5	D	
F6	E	
F7	F	
F8	G	
SHIFT F1	\	
SHIFT F2	a	
SHIFT F3	b	
SHIFT F4	c	
SHIFT F5	d	
SHIFT F6	e	
SHIFT F7	f	
SHIFT F8	g	↓
	(SOH) g (CR)	

The use of these Dedicated Function keys is dictated by the specific applications program to which the VDT is responding.

### B.5.10 Programmable Function Keys

#### Load Function Key Memory with User Text or Host Macro; Execute Same (ESC | or Hex 7C)

This sequence provides the user and system programmer with access to 219 bytes of memory, which are allocated for use with the Programmable Function keys, or for storage and implementation of "host macros".

The Programmable Function keys, PF1 through PF3, are in the top row of the numeric keypad. When SHIFTed, these keys become PF4 through PF6, for a total of six Programmable Function keys.

The versatility of the VDT firmware permits this memory function to be used in two ways: by the user, to store frequently used text, local control codes, or program responses, which can then be activated and/or displayed by pressing the Programmable Function keys; or by the programmer, to store host subroutines (macros), instead of using valuable space in the host read/write memory (the programmer can boot or down-load to the 219 bytes of VDT memory).

The text stored in the Programmable Function keys and host macros can be executed from the host computer. The user can execute only the text stored in the Programmable Function keys.

The basic format for storing data in keys PF1 through PF3, or "PF4" through "PF4" (shifted) is as follows:

**ESC SHIFT-| (p1) (p2) "TEXT" CTRL-Y**

ESC SHIFT-| accesses the function keys.

p1 is the first parameter or value entered.

p2 is the second parameter or value entered.

"TEXT" is the data to be stored in a function key.

CTRL-Y (EM) stores the data in the key, and returns the VDT to normal operation.

NOTE: If the CTRL-Y "EM" control code is desired as text, and not as the ending delimiter of the function key, it (EM) must be preceded by an ASCII DLE (Hex 10) control code.

Parameter p1 selects the function key to be programmed (stored with text). Entering the numbers 1, 2, or 3 at the keyboard selects the PF1, PF2, or PF3 key as the function key to receive and store text. Entering a 4, 5, or 6 selects the shifted PF4, PF5, or PF6 function key as the key to receive and store text.

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To select a host macro, parameter p1 must be an A, B, C, D, E, or F.

Parameter p2 is common to both Programmable Function keys and host macros. It gives the user and programmer a choice of four values (numbers entered at keyboard) with which to specify function key and macro operation. These values are:

- 0(zero) - Allows the host to execute function keys or macros.
- 1 - Full Duplex (FDX) Mode. Function keys and macros, when activated, cause the VDT to transmit their stored text.
- 2 - Local (LOC) Mode. Function keys and macros, when activated, will act as though the stored text was transmitted from the host.
- 3 - Half-Duplex (HDX) Mode. Function keys and macros, when activated, cause the VDT to both act on and transmit their stored text.

Text can be entered until up to 219 characters (bytes) are used. This is the total amount of memory reserved for storing function key and macro data, and can be divided among the keys or macros as desired.

NOTE

Control codes are displayed and stored when entering function key text, but the codes are not acted upon until the function key is pressed (to display and/or transmit the stored text). Attention must be paid to the subsequent actions of the control codes to properly format the display of function key text.

The example that follows is for storing repetitive "form-letter" text in a Programmable Function key for subsequent display and local PRINT operations. Note the Carriage Return (CR) and Line Feed (LF) control codes, which are displayed and stored when entering this three-line message:

```
ESC SHIFT-| 1 2
"We received your check for $      . Thank you
very much(CR,LF) for your prompt attention to this
matter.(CR,LF,CR,LF)Sincerely yours,"CTRL-Y
```

After entering the person's name, address, and salutation, the PF1 key is pressed to display the form-letter text. The PRINT operation then follows. Note that no provisions are made for editing function key entries; the entire sequence must be repeated when correcting keystroke errors.

### **B.5.11 Graphics Mode Operations**

Two sets of graphics characters are available for use with the standard VDT. These are the Line Graphics Character Set and the Block Graphics Character Set.

#### **Line Graphics Character Set**

The Line Graphics Character Set contains 16 characters, which allow ruled forms, charts, and tables to be created onscreen, and then to be printed out.

As shown in Figure B-9, each of the line graphics characters is produced by a corresponding alpha-character key, which can be shifted or unshifted. (Shifted alpha characters are shown only for sake of clarity.)

To enable the Line Graphics Mode, while using the Standard Character Set, press ESC SHIFT-\$. To disable the Line Graphics Mode, press ESC SHIFT-%.

#### **Block Graphics Character Set**

The Block Graphics Character Set contains 64 characters, and allows the creation of various patterns, bold borders, and other visual effects.

As shown in Figure B-9, each of the block graphics characters is produced by a corresponding alpha, numeric, punctuation, or symbol key, using SHIFT as required.

To enable the Block Graphics Mode, press CTRL-\ (to enable International Character Set) and ESC SHIFT-\$. To disable the Block Graphics Mode, press ESC SHIFT-%.

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

Figure B-9. Line and Block Graphics Character Sets

**B.5.12 International Character Set**

The International Character Set contains 48 characters, and accommodates the majority of languages indigenous to the West European, Scandanavian, and Latin American countries.

As shown in Figure B-10, each international character is produced by a corresponding upper or lowercase alpha character. The symbol for the British pound note (£) is produced by the shifted # key.

To enable the International Character Set, press CTRL- \ . To disable the International Character Set, press CTRL- ] .

MSB LSB	BYTES 0 THRU C	D	E	F
0		À	à	∅
1		Á	á	Õ
2		Ä	ä	Ü
3		Æ	æ	Û
4		À	á	β
5		Ã	ã	§
6		Ç	ç	ö
7		È	è	π
8		É	é	∅
9		Ê	ê	õ
A		Ì	ì	ù
B		Í	í	ü
C		Ñ	ñ	ı
D		Ö	ö	ı
E		Ò	ò	¢
F		Ó	ó	£

Figure B-10. International Character Set

**B.5.13 Modem Port Pin Assignments**

Table B-16. Modem Port Pin Assignments

PIN	SIGNAL	DESCRIPTION
1	Protective Ground (FG)	This is chassis ground, and is not to be used as signal reference ground.
2	Transmitted Data (TD)	VDT Origin; ASCII data transmitted to host device. When idle, held in MARK state.
3	Received Data (RD)	External Origin; ASCII data received from host device.
4	Request To Send (RTS)	VDT Origin; asserted when power is ON.
5	Clear To Send (CTS)	External Origin; asserted when connected.
6	Data Set Ready (DSR)	External Origin; asserted for VDT to receive data.
7	Signal Ground (SG)	Common ground reference potential for all voltages on the interface. This is permanently connected to the signal and chassis ground.
8	Data Carrier Detect (DCD)	VDT Origin; always asserted when power is ON.
15	(Neg)	RS-422A; received from host device.
17	(Pos)	RS-422A; received from host device.
19	(Neg)	RS-422A; transmitted to host device.
20	Data Terminal Ready (DTR)	VDT Origin; asserted when power is ON, unless terminal is in Local Mode.
25	(Pos)	RS-422A; transmitted to host device.



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**B.5.14 Auxiliary Port Pin Assignments**

Table B-17. Auxiliary Port Pin Assignments

PIN	SIGNAL	DESCRIPTION
1	Protective Ground (FG)	This is chassis ground, and is not to be used as signal reference ground.
2	Received Data (RD)	External Origin; ASCII data received from Auxiliary Port device. When idle, should be held in MARK state.
3	Transmitted Data (TD)	VDT Origin; ASCII data transmitted to Auxiliary Port device.
4	Request To Send (RTS)	External Origin; must be asserted to receive data from Auxiliary Port device.
5	Clear To Send (CTS)	VDT Origin; asserted when power is ON.
6	Data Set Ready (DSR)	VDT Origin; must be asserted when power is ON.
7	Signal Ground (SG)	Common ground reference potential for all voltages on the interface. This is permanently connected to the signal and chassis ground.
8	Data Carrier Detect (DCD)	VDT Origin; always asserted when power is ON.
15	(Neg)	RS-422A; transmitted to Auxiliary Port device.
17	(Pos)	RS-422A; transmitted to Auxiliary Port device.
19	(Neg)	RS-422A; received from Auxiliary Port device.
20	Data Terminal Ready (DTR)	External Origin; asserted when power is ON.
25	(Pos)	RS-422A; received from Auxiliary Port device.

B.5.15 ASCII Control Codes

Table B-18. ASCII Control Code Chart

BITS B7 B6 B5 B4 B3 B2 B1	CONTROL		NUMBERS SYMBOLS		UPPER CASE		LOWER CASE	
	0 0 0 0	NUL	DLE	SP	0	@	P	'
0 0 0 1	SOH	DC1	!	1	A	Q	a	q
0 0 1 0	STX	DC2	"	2	B	R	b	r
0 0 1 1	ETX	DC3	#	3	C	S	c	s
0 1 0 0	EOT	DC4	\$	4	D	T	d	t
0 1 0 1	ENQ	NAK	%	5	E	U	e	u
0 1 1 0	ACK	SYN	&	6	F	V	f	v
0 1 1 1	BEL	ETB	'	7	G	W	g	w
1 0 0 0	BS	CAN	(	8	H	X	h	x
1 0 0 1	HT	EM	)	9	I	Y	i	y
1 0 1 0	LF	SUB	*	:	J	Z	j	z
1 0 1 1	VT	ESC	+	;	K	[	k	{
1 1 0 0	FF	FS	,	<	L	\	l	
1 1 0 1	CR	GS	-	=	M	]	m	}
1 1 1 0	SO	RS	.	>	N	^	n	~
1 1 1 1	SI	US	/	?	O	_	o	DEL

LEGEND



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### GLOSSARY OF RELATED TERMS

#### alphanumeric

The combination of alphabetic and numeric characters seen on the screen (i.e., a filename; e.g., SECT1.TXT).

#### application program

A program that performs specific tasks, such as word processing or accounting. An application program is separate from the basic operating system.

#### ASCII

Acronym for American Standard Code for Information Interchange. A standardized 7-bit sequence for digital data communications.

#### backup

To copy an entire disk or individual file(s) onto another diskette for future use, if the contents of the original disk are inadvertently destroyed.

#### bit

The abbreviation for a binary digit, the smallest piece of information recognized by a computer. Usually represented by a 1 (on) or 0 (zero) (off).

#### boot

Another term used to describe system initialization.

#### byte

A group of 8 bits, which represents a single character.

#### character

A single letter, number, or symbol used to represent computer information.

#### cold boot

This type of initialization is performed by powering up and resetting the system.

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command

A word, abbreviation, or character used to instruct the computer to invoke a program that performs a specific operation.

console

Another term to describe the display terminal and keyboard. Primary input/output device. The user communicates with the operating system or application program via this device.

cursor

A block or symbol shown on the display screen, indicating where the next entry will be positioned. Can be a blinking block, underline, or other symbol.

data file

A collection of related information that generally requires a command file to manipulate it.

default

Currently selected disk drive and user number. Any command that does not specify a disk drive or a user number references the default disk drive and user number.

disk, diskette

Magnetic media used to store computer information. Disk can refer to a diskette, a removable cartridge disk, or a fixed hard disk. Diskette is used interchangeably with the term "floppy disk."

disk drive

The physical mechanism in the Desktop Unit which reads information from (retrieves it), or writes information to (records it) the disk or diskette.

execute a program

Run a program. When a program is running, the computer is executing a sequence of instructions.

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file

A collection of related data residing on disk(ette), treated by the computer as a single unit which can be read from or written to. The user can create files on a disk.

floppy disk (diskette)

Flexible magnetic disk used to store information. Floppy disks are available in 5-1/4 and 8-inch diameters.

hard disk

Rigid, platter-like, magnetic disk sealed in a container. Has a larger storage capacity than a floppy disk.

hard disk drive

The housing for a hard (fixed) disk, which is used as a data storage medium.

hardware

Physical components of a computer; i.e., display terminal, keyboard, disk drives.

initialize

To power-up or reset the system (also referred to as boot).

input

Information entered into a computer, usually by an operator typing at the display terminal or by a program reading from the disk.

k

The symbol for the prefix kilo, representing the multiple  $10^3$ ; i.e., 1000 in decimal notation.

K

When referring to storage capacity, represents the multiple  $2^{10}$ ; i.e., 1024 in decimal notation. For example, the expression 1K bytes of memory represents 1024 bytes; the expression 8K bytes represents 8 times 1K bytes, or 8192 bytes.

load

To store a program in computer memory.

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M

The symbol for the prefix mega, which represents the multiple  $10^6$ ; i.e., 1,000,000 in decimal notation. When referring to storage capacity, represents the multiple  $2^{20}$ ; i.e., 1,048,576 in decimal notation.

memory

The part of the computer hardware that retains information. Reference to memory is normally made in "K" increments; "K" stands for 1024.

microprocessor

Silicon chip that is the Central Processing Unit (CPU) of the microcomputer.

modem

Abbreviation for modulator-demodulator, which transforms (modulates) computer signals into telephone signals, and transforms (demodulates) telephone signals into computer signals. Modem functions are necessary because computer signals and telephone signals are not compatible.

multi-programming (multi-tasking)

Capability of the operating system to coordinate the execution of more than one program at a time.

multi-user

Capability of an operating system to support more than one independent user or display terminal initiating different programs at the same time.

network

Term used in the computer industry to denote the connection of two or more computers, and other devices such as printers.

operating system

- The collection of programs that enables the computer to function as an intelligent machine, and allows for the development and execution of application programs.

operating system banner

Information identifying the operating system that is loaded into the system. It is displayed at system initialization.

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output

Information that the processor sends to the console or printer.

peripheral device

External equipment that is connected to the computer but is not a part of it; e.g., a printer, a modem.

program

A precise sequence of instructions used to direct the computer to perform requested operations.

prompt

An indicator, in the form of a character or symbol, that the system is ready for input, or a message guiding the user through a computer process.

Read-Only

Attribute assigned to a disk file or a disk drive, restricting file access. A file can be read from but not changed. When the attribute is assigned to a drive, you can read any file on the disk, but cannot add a new file, or alter or erase any of the disk.

Read-Write

Attribute assigned to a disk file or a disk drive. Allows you to read from and write to a specific Read-Write file, or to any file on a disk in a drive that is set to Read-Write.

RO

Abbreviation for Read-Only.

RW

Abbreviation for Read-Write.

software

Programs that a computer uses, such as an operating system and application program.

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syntax

Format to be used when entering a given command.

system

The combination of all parts of a device, such as a computer, that enable it to perform a specific function.

system prompt

Symbol displayed by the operating system indicating that the system is ready to receive input. See **prompt**.

TPI

Acronym for tracks per inch allocated on a disk (i.e., 48 TPI or 96 TPI) or other data storage medium of this type. The TPI of the medium is arranged so that the computer can read from or write to it.

tracks

The concentric rings dividing a disk, from which data is read and to which data is written.

utility

A program that enables the user to perform certain operations, such as copying files, erasing files, and editing files.

warm boot

A term used to refer to program interruption caused by pressing CTRL-C at the keyboard.

Winchester disk drive

Industry name for the technology applied to the type of hard (fixed) disk drives utilized in the DBS 16 and other DBSI microcomputers. See **hard disk drive**.



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**write-protect notch**

The small, square hole cut into the disk cover that, when covered with a tab, protects the disk against accidental write operations performed by the computer.

**write-protect tab**

A small stick-on, peel-off tab which covers the write-protect notch, in order to prevent writing to a disk.

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